

UNIFIED FACILITIES CRITERIA (UFC)

DESIGN: AQUATIC FACILITIES



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UNIFIED FACILITIES CRITERIA

AQUATIC FACILITIES

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HQ AIR FORCE SERVICES AGENCY (Preparing Activity)

Record of Changes (changes are indicated by \1\ ... /1/)

Change No.	Date	Location

This Unified Facility Criteria supersedes Air Force Pamphlet AFPAM 88-52 *Swimming Pools* dated 1984.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the Department of Defense (DoD) Field Activities in accordance with [USD\(AT&L\) Memorandum](#) dated 29 May 2002. UFC will be used for all DoD projects and work for other customers, where appropriate.

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CHAPTER 1

INTRODUCTION

1-1 **PURPOSE**

Unified Facilities Criteria (UFC) [4-750-07F](#), *Design: Aquatic Facilities* has been developed by the [Air Force Services Agency](#) (AFSVA) and provides guidelines for evaluating, planning, programming, and designing Air Force (AF) indoor and outdoor aquatic facilities. This UFC provides information and criteria for the design of facilities that support AF swimming and outdoor recreation programs. This UFC is intended to help change the historic attitude that swimming pools are essentially a “hole in the ground” for swimming by promoting innovative designs that are functional, economical, safe, aesthetically pleasing, and meet the expectations for modern aquatic facilities. Each design should satisfy the unique requirements of each installation and at the same time be compatible with the local environment and specific site conditions. A customized individual solution to the particular needs of each project is the primary objective of this UFC.

1-2 **SCOPE AND USE**

Information provided by this UFC applies to the design of all aquatic facility construction projects, including additions, alterations, and renovation projects in the continental United States (CONUS) and overseas (OCONUS). It also applies to the procurement of design/build services for the above noted projects. This document is not intended to provide all of the information needed to identify project requirements or successfully prepare project designs. It is also not intended as a substitution during design for thorough review by individual program managers and operations staff. This UFC is to be utilized in conjunction with [Department of Defense](#) (DoD) criteria, AF specific documents, aquatic industry publications, and regulatory agencies, as required. Additional information on the unique program and design requirements of local projects must be obtained at the installation level.

This UFC provides guidance for development of aquatic facilities appropriate to support local operations at individual AF installations and the [AFSVA Golden Eagle Standards](#) (GES) for aquatic facilities and swimming programs. This information may be used by architects/engineers (A/E), designers, base civil engineers (BCE), aquatic facility directors, Major Command (MAJCOM) and headquarters review personnel, and others involved in the development and approval of aquatic facility construction projects. It is intended to help all participants better understand AF aquatic facility requirements, programs, and design criteria so they can effectively participate in the project development process. Electronic versions of this UFC may be obtained from the [AFSVA](#) website in a portable document file (PDF) format that may be viewed online or downloaded for printing and off-line viewing.

1-3 **ORGANIZATION**

This UFC is organized to provide the data and guidance needed at each stage of the project development process. Alteration and renovation projects should update existing

facilities to meet this guidance and criteria within budgetary constraints. This document provides resources for determining program requirements, site evaluation and planning, overall facility design, and design of outdoor and indoor spaces. Functional relationship diagrams, site layouts, floor plans, and other illustrative information have been included to provide examples of the guidance provided in this UFC.

1-4 **CANCELLATION**

This UFC cancels and supersedes the Air Force document AFPAM 88-52 *Swimming Pools*, dated 1984.

1-5 **DISTRIBUTION OF RESPONSIBILITIES**

Air Force activities and A/E designers using this UFC are advised there are three levels of responsibility in the development of facility designs. First, there is the local installation that identifies the need for a new, modernized, or enlarged aquatic facility and initiates the project development process. Second, the Major Command (MAJCOM) is responsible for management of design and construction of their facilities. Third, the AFSVA sets the standards for all AF swimming programs and determines the facilities and equipment required to perform the operations.

1-6 **DEFINITIONS**

Aquatic facilities may have a variety of different components depending upon the unique requirements for each facility. Below are some common definitions associated with major aquatic facility components:

- **Swimming Pool:** Any artificial basin of water constructed, installed, modified, or improved for the purpose of swimming, wading, diving, recreation, or instruction. It does not include pools designed to be used exclusively for military training or operations.
- **Natatorium:** An indoor or enclosed swimming pool.
- **Spa:** An artificial basin of water designed for recreational use and/or therapeutic use and is not drained, cleaned, and refilled for each individual. Spas may include hydro jet circulation, hot or cold water, air induction systems, or any combination thereof. It does not include pools used under the direct supervision of medical personnel. Spas are not included as part of this UFC.
- **Wading Pool:** A pool that is no more than 0.61 meter (24 inches) deep and intended to be used by young children.
- **Spray Ground:** An area that includes water spraying devices and other water related recreational equipment intended to be used by young children.
- **Pool Deck:** The concrete or hard surface area surrounding the pool water areas.

- **Bathhouse:** A building that typically contains changing areas, restrooms, and locker areas. Bathhouses may also contain administrative, entry control, food service, storage, mechanical, and other related functions or areas.

1-7 **MISSION STATEMENT**

The mission statement for aquatic facilities at AF installations is to provide state-of-the-art aquatic facilities that support the programs and services to meet the professional and recreational needs of the base community, including active duty personnel (all U.S. and host nation military), families, retirees, civilian employees, contractors, and other authorized users. Aquatic facilities at AF installations must be designed to support the AF mission and promote the morale, welfare, and recreation (MWR) programs and activities of the Outdoor Recreation Branch of the AFSVA. The mission objectives for AF aquatic facilities include the following priorities ranked by order of importance:

- 1) Fitness
- 2) Family Wellbeing
- 3) Unit and Community Cohesion
- 4) Individual Wellbeing

1-8 **AQUATIC FACILITY CLASSIFICATIONS**

Aquatic facilities are intended to provide a wide variety of swimming activities allowing maximum user participation that promotes physical fitness, health, training, and recreation. These new or renovated facilities shall also offer swimming programs that satisfy the leisure time needs and interests of AF personnel and their families with an optional provision for spectator entertainment. The programs to be considered include open swimming, diving, wading, sunbathing, lap swimming, swimming instruction, water safety instruction, life saving instruction, competitive swimming and diving, aquatic events involving spectators, aquatic instruction (like canoeing, kayaking, and scuba diving), pilot training for parachute landing in water, and pilot survival training. To support these objectives, the two general types of aquatic facility classifications include outdoor pools and natatoriums (indoor pools).

1-8.1 **Outdoor Pools**

Outdoor aquatic facilities feature water areas, deck areas, and other public and support areas that are not contained within an enclosed structure. Most of these areas will include a bathhouse building and other structures that contain showers, restrooms, changing areas, and other staff or administrative areas. Portions of the water areas and pool deck should be covered by overhead sunscreens to provide protection from ultra-violet (UV) exposure.

1-8.2 **Natatoriums (Indoor Pools)**

Natatoriums feature enclosed spaces for water areas, deck areas, and other public and support areas. These enclosures usually include showers, restrooms, changing areas, and other staff or administrative areas within the same building structure. Some indoor

pools have been created by erecting an enclosure for an existing outdoor facility to create an indoor environment. Natatoriums are permitted at installations where:

- The outdoor temperature or precipitation prohibits outdoor swimming from June 1 to September 1.
- Off-season swimming facilities are necessary for various types of instruction or exercise of the military population.
- It is important to provide certain aquatic activities regardless of the weather.

1-9 **OPERATIONAL IMPLICATIONS**

Procedures for installation level outdoor recreation programs, aquatic activities, operation, and maintenance of AF pools, including natatoriums, are provided in the following documents:

- AFI 34-268, *AF Outdoor Recreation Programs and Procedures*
- [AFI 32-1067](#), *Water Systems*
- [AFOSH 48-14](#), *Swimming Pools, Spas and Hot Tubs, and Bathing Areas*
- [MIL-HDBK-1005/7A](#), *Water Supply Systems*
- [UFC 3-230-02](#), *Operations and Maintenance: Water Supply Systems*

Operational and procedural issues must be considered during the design process because they have a direct impact on the function of each facility. For example, the size and configuration of a pool facility dictates specific staff and lifeguard requirements. Most importantly, the users need to be included in the group of persons determining operational, procedural, and program requirements. The architect and other engineering consultants should be considered advisors to the base. Architects/engineers (A/E), designers, base civil engineers (BCE), and others involved in the development and approval of aquatic facility construction projects must have a thorough understanding of the anticipated installation-specific programs and operational requirements.

CHAPTER 2

PLANNING AND PROGRAMMING

2-1 **PLANNING CONSIDERATIONS**

The content of Chapter 2 provides guidelines and information needed for planning and programming AF aquatic facilities and the infrastructure to support them. Aquatic facility development planning and the programming of facility space may be different for every project depending upon the unique factors regarding each installation. Local requirements concerning building programs, design criteria, and technical systems should consider the adequacy of existing facilities to meet current and future needs. The potential retention and renovation of existing facilities should also be analyzed and compared to the need for new construction or additions to existing facilities.

2-1.1 **Program Definition**

The Requirements Document defines the program for design of an individual project, including functional requirements, design criteria, and cost information. This includes the space programming guidance found in this chapter, plus the site design, building design, and facility systems concepts located in [Chapter 3](#), *General Design Guidelines*. In addition, any unique, local requirements concerning building programs, design criteria, and technical systems should be included in the Requirements Document.

2-1.2 **Project Validation Assessment**

The Project Validation Assessment (PVA) of all core functional areas and installation specific amenities to be included must satisfy the particular needs and policies of each base, and comply with the overall size and budget limitations for the project. The specific type, number, and size of spaces appropriate for the users will vary depending on the climate, location, and demography of each base. For example, if there is high proportion of dependents on the base, the facility should provide a spray ground or wading pool for children. If there is a strong interest in competitive swimming or diving, the pool should be properly equipped for these functions.

2-1.3 **Operating Policies**

Selected programs and spaces for each facility may vary widely depending on the anticipated operating policies of each facility. As a result, it is important early in the planning process to determine preferred operating procedures on the types of programs, activities, and the method of clothing storage.

2-1.4 **Programs and Activities**

The type of activities to be provided in the facility (competitive swimming, intramural or varsity competition, instruction courses, recreational use, lap swimming or wading) should be analyzed to determine the scheduling and staffing requirements for each. Consider specialty activities that may be desired at each installation, such as “dive-in movies” (movies that may be viewed while in the pool), underwater hockey, underwater pumpkin carving, pumpkin plunge and margarita’s, massages and movies, turkey toss,

Easter egg splash, spring fest, pool parties with rental items; bouncy house, covered party pavilion rentals, dive toy rentals, fishing demonstrations, and other specialty activities. Consider the requirements for anticipated instructional programs, such as swimming lessons, lifeguard classes, life saving instructions, and self-contained underwater breathing apparatus (SCUBA) training. Daily pool activities may also be offered prior to pool opening.

2-1.5 Competitive Swimming

The type of competitive swimming events to be hosted at an aquatic facility has a major impact on the planning of the facilities to be provided. Facility requirements and rules may vary depending upon the different institutions that may be desired to sanction competitive events. For example, lane bottom and target wall marking requirements are different for many of the major governing institutions that sanction major events. Consider the impact of specific institutional and host nation requirements if competitive swimming will be a part of the program requirements. Major swimming institutional organizations include:

- **AAU** – [Amateur Athletic Union](#)
- **FINA** – [Federation Internationale de National](#)
- **NCAA** – [National Collegiate Athletic Association](#)
- **NFSH** – [National Federation of State High School Associations](#)
- **USS** – [USA Swimming](#)

2-1.6 Clothing Storage Options

The selected method of storing user clothing may be the single most important factor influencing the design and operation of the bathhouse. Each system has a major impact on the circulation and staffing of the bathhouse. There are two options available:

- 1) A basket check-in system that is monitored by a staff member. Customers collect a basket from a central point and return it to a staff member for storage while swimming.
- 2) A locker or basket system that is handled without staff supervision. Lockers or storage baskets are provided in the dressing room or on the pool deck where the clothing may be stored and monitored by the owner.

2-1.7 Supervision and Observation

A strict system of observation and control is crucial in an aquatic facility. The key to an efficient bathhouse design is to organize these surveillance requirements in a way that will minimize stall numbers and customer movement. Surveillance of three activities is essential:

- **Check-In and Check-Out** – ensures entry by approved users only.

- Storage of Clothes (if handled by staff) – reduces opportunity for theft.
- Pool and Pool Deck Activity – ensures proper safety for customers.

2-1.8 Check-In and Check-Out Procedures

A system must be provided to supervise procedures for entry into and exit from the facility. Policies must be provided for the type of identification required and the method of verification, payment (if required), and supervision.

2-1.9 Scheduling

After determining the programs to take place in the facility, a system of organizing them on a daily and seasonal basis should be developed. There are many programs, such as kayaking, SCUBA training, learn to swim classes, lap swimming, and special programs for handicapped training that may interfere with general or free swim periods. Careful scheduling can allow a facility to greatly expand its potential program uses, as well as eliminate conflicts.

2-1.10 First Aid

In spite of the most careful planning and safety procedures, there is always the potential for an accident. Policies and facilities must address rescue procedures and include access to the pool deck for rescue personnel.

2-1.11 Food and Beverage Service

Policies on food service can vary from no food permitted, to vending machines, to a snack bar. Once the level of service is decided, design considerations must be determined relating to location, fenced or open access to the pool deck, trash removal, and types of food and beverage containers allowed. No glass should be allowed on the pool deck at any time.

2-2 SPACE ALLOCATION CRITERIA

The recommended set of functional areas and spaces for different sizes of aquatic facilities are shown in [Section 2-2.2 Table: Space Allowances](#). This table provides example space sizes for each component of representative facilities in each aquatic facility program size category. These are not definitive space programs, but guides to approximate space sizes recommended for the given size facility. For facility sizes not included in this table, proportionally adjust the program figures shown for the nearest larger or smaller sized facilities. In developing the space program for an individual facility, consider the issues of overall facility design and the functional relationships discussed in this UFC.

Each base may also determine that different or additional requirements are relevant to its local program. These considerations may affect the functional areas and spaces included in the program and their relative sizes. Space allowances for aquatic facilities found in [AFH 32-1084, Facility Requirements](#), dated 1 September 1996 will be updated at its next revision to reflect the new space allocation information in the space allocation table.

2-2.1 Facility Size

The overall size planned for the facility shall be determined by the particular needs of each base, including the following factors:

- Size of the U.S and host nation military population in the area served by the base.
- Number of youth and children served by the base. These are normally the most frequent users of outdoor pools and associated activities.
- Number of dependent spouses, retirees, host nation personnel, contractors, and other authorized users to be served by the facility.
- Availability of other aquatic facilities on base and in the vicinity of the base.
- Anticipated need for conducting competitive swimming events.
- Anticipated need for pool use in training activities, such as SCUBA and deep water survival.

2-2.2 Table: Space Allowances

(Space allocation table to be determined)

2-3 FACILITY REQUIREMENTS

Consider the issues affecting overall facility design and the functional relationships discussed in [Chapter 3](#) and [Chapter 4](#) when developing the space program for an individual facility. Facility requirements are based on local conditions and identified requirements of the community served.

2-3.1 Occupancy Requirements

Accepted industry standards for determining the occupancy requirements of a pool and the proportional size of supporting components are as follows:

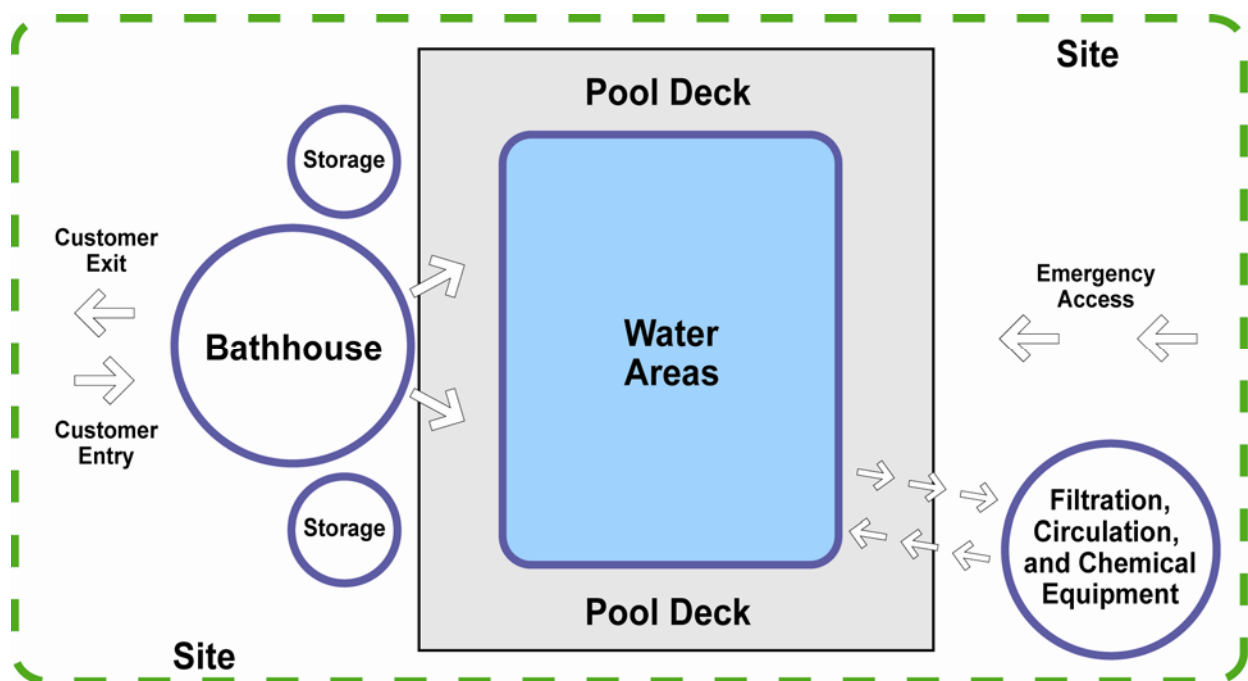
- Main pools with water 1.5 meters (5 feet) deep or less: 1.4 sq. meters (15 sq. feet) per swimmer.
- Diving areas: 2.3 sq. meters (25 sq. feet) per swimmer.
- Spray grounds and wading pools: 1.4 sq. meters (15 sq. feet) per child.
- Bathhouses: Sized to accommodate 20% of the aquatic facility maximum capacity, .9 to 1.4 sq. meters (10-15 sq. feet) of dressing area per person, and lockers or baskets for clothing storage to meet 100% of peak facility capacity.

2-3.2 Core Functional Areas

Most aquatic facilities will need four core functional areas with local variation in the scope of operation under each category. These functional area categories include the following:

- 1) Water Areas
- 2) Pool Deck
- 3) Bathhouse
- 4) Filtration, Circulation, and Chemical Equipment

2-3.3 Figure: Core Functional Area Relationships



2-4 SITE SELECTION

Aquatic facilities should be located near the center of base activities and facilities such as the Fitness Center, Health and Wellness Center (HAWC), and the Youth Center, where possible. Uncongested areas are preferred, but aquatic facilities need to be conveniently located near dormitories, housing, billeting, sports and fitness centers, and physical recreation areas so that they are near the hub of community activity. Avoid locations near busy intersections, arterials, airfields, and industrial facilities. Consider locating pool facilities inside or adjacent to the Fitness Center. Evaluate the potential impact of natural site features, such as terrain, existing trees and vegetation, wetlands, and water retention areas on the proposed facility design. Existing natural site features may be incorporated into required site elements like antiterrorism/force protection (AT/FP) setback distances or vehicle barriers that may help to blend the facility into the natural setting of the site. Potential sites for aquatic facilities should be selected to minimize or eliminate problems in design, construction cost, and pool function.

2-4.1 Site Size

The site shall be large enough to accommodate all the components of the facility, including those expected to be added in the future. These components include vehicle access, parking, pedestrian access, open areas that can be used for playing fields (throwing Frisbees, horseshoes, and similar recreational activities), and the aquatic facility complex. In addition, the size of the site shall allow for open or landscaped spaces around these components for drives and walks, safe separation between activities, grading transitions between components, and required setbacks from adjacent property. For initial planning purposes, a site size can be considered satisfactory if the area of the site is at least the sum of the following:

- Adequate exterior circulation and parking areas.
- The area of the swimming pool, surrounding pool deck, and internal circulation areas.
- The area of the spray ground or wading pool and surrounding deck.
- The gross area required for the bathhouse, storage areas, and other support buildings.
- The gross area needed for water circulation, filtration, and chemical equipment facilities.
- Area for playing fields, grass areas, picnic tables, and landscaping, including a buffer zone around playing areas and the overall facility.

More area may be needed if the site has any special features, such as irregular contours, existing trees, or rock outcroppings to be preserved. Assure the selected site will accommodate an adequate number of parking spaces convenient to aquatic facility entrance and antiterrorism/force protection (AT/FP) setback requirements provided in [UFC 4-010-10, DoD Minimum Antiterrorism Standoff Distances for Buildings](#). A preliminary site design should be prepared to ensure the basic building and site criteria can be accommodated. Site size should provide for future expansion, if practical.

2-4.2 Site Considerations

Locate the bathhouse and water areas on the site to provide the most convenient access, take advantage of desirable views, preserve natural site features, and provide protection from undesirable winds and glare. Provide natural or constructed shading for the bathhouse, pool deck, and children's areas for protection from excessive sunlight. Locate the customer entrance in front of the facility near the street or near a vehicular drop-off loop with convenient sidewalk access to the entrance. Ideal sites for aquatic facilities should meet the following criteria:

- The site should be approached by sidewalks and should not require pedestrians, particularly children, to cross heavily traveled streets or circulation areas within the parking lot.
- The necessary utilities, water, sewerage, natural gas, and electricity are readily available.

- The topography is level enough for construction of the pool.
- The soil is stable, but free of rock which is costly to excavate.
- The site is not close to heavy industrial smoke or other unpleasant or harmful pollutants.
- The site is near other recreational activities, such as youth centers, clubs, and athletic facilities.
- Sites immediately adjacent to housing, hospitals, or other facilities that might be disturbed by recreational noise are not preferred. Similarly, sites in the area of frequent airplane traffic should be avoided.
- The site should have good natural drainage.
- The site selected should minimize wind blown debris and reduce wind damage to structures, furnishings, and equipment.

2-4.3 Site Access

Provide easy access by pedestrians, automobiles, and base public transportation traffic. Address accessibility issues for the handicapped in accordance with the accessibility requirements identified in [Section 2-5, Accessibility](#). Choose a site with a prominent, visible location. The facility should be easily identifiable from approaching cars, base transportation, and pedestrian pathways. Consider a dedicated service drive near the filtration, circulation, and chemical storage areas for easy maintenance and repair access. This service drive should also have convenient access to the pool deck areas so that it may be utilized by emergency personnel and allow evacuation of injured customers without needing to go through the bathhouse or locker rooms.

2-4.4 Site Utility Requirements

Potential sites should be evaluated to determine the availability of utility services and conformation of easement and property lines. Locate aquatic facilities where access to major utilities is easily accessible; these utilities include water, sewage, electricity, telephone, communications, and natural gas. Storm or sanitary sewer systems capable of handling large volume water discharge are needed as required by local codes. Provide water service, natural gas, steam service or fuel oil system (whichever is used), electricity, telephone, security, and fire alarm service to the building in accordance with requirements in [AFH 32-1084, Facility Requirements](#), [UFC 1-200-01, Design: General Building Requirements](#), and local service procedures. Include connections to the base computer network and communication systems.

2-4.5 Topography and Sub-Soil Conditions

The existing topography of potential sites should be evaluated to determine the impact of existing conditions on potential construction. Geotechnical investigations should be conducted to identify sub-soil conditions, the elevation of the water table, and the bearing capacity of the soil. The A/E should make recommendations regarding the locations of soil borings. Evaluation of the soil report should be a primary consideration of potential sites. Geotechnical data should be evaluated by the structural engineer to determine the most cost-effective foundation system. Consider the impact of existing

subsurface rock on the position of the pool, buildings, parking areas, and other structures so that excavation can be minimized and consider the possible recycling of excavated rock for alternative uses.

2-5 **ACCESSIBILITY**

As a matter of law, new construction, additions, and renovations of existing facilities must be designed and constructed in compliance with the [Architectural Barriers Act](#) (ABA), which requires that people with disabilities have access to facilities designed, built, or altered with Federal money or leased by Federal agencies. DoD has not yet issued implementing guidance for the new [Architectural Barriers Act Accessibility Guidelines](#) published by the [U.S. Access Board](#) on July 23, 2004. Nonetheless, the best practice is to comply with these guidelines, which are posted on the Board's web site at <http://www.access-board.gov/>.

Until DoD implements the new ABA guidelines, please be aware that the Secretary of Defense has established a policy that DoD facilities will comply with the accessibility requirements established under the [Americans with Disabilities Act](#) (ADA), instead of the ABA requirements, whenever a particular ADA requirement is more stringent than the corresponding ABA requirement. This requires analysis of the [Uniform Federal Accessibility Standards](#) (UFAS) issued in 1984 and the [Americans with Disabilities Act Accessibility Guidelines](#) as amended through 2002, both of which are also posted on the Board's web site.

All aquatic facility functional areas shall be barrier-free and accessible to the physically handicapped as required by law. Site, building, and pool designs should enable physically handicapped persons to act independently and enjoy the full range of programs provided. Level changes may be included, but must be accommodated by ramps suitable for wheelchair access, both indoors and outdoors. Accessible entry to pools may be accomplished by utilizing zero entry depth ramps with ADA-ABD compliant handrails or by lift and assistance equipment designed specifically for the handicapped. The need for special equipment, such as transfer benches, crane lifts, or ramps into the pool shall be considered during the design process. Consider the need for specialized therapeutic training to support medical facilities or other installation-specific programs.

2-6 **BUILDING CODES**

All AF aquatic facilities must be designed, constructed, and altered in accordance with DoD criteria and local codes. These criteria are based on national standards, private sector consensus standards, and model codes. Refer to [UFC 1-200-01](#), *Design: General Building Requirements* and [UFC 3-420-01](#), *Plumbing* for specific guidance. In the event of conflicts between model codes and DoD criteria, use DoD requirements. For situations outside the continental United States (OCONUS) where there is a conflict between mandatory code requirements, the national building code would take precedence.

2-7 **ANTITERRORISM/FORCE PROTECTION**

The primary antiterrorism/force protection (AT/FP) consideration for pools is to secure the circulation, filtration, and chemical systems that may be vulnerable to terrorists. The

AT/FP objectives of the DoD are to reduce personnel exposure to security threats and limit property damage. The DoD policy and guidance for antiterrorism and the physical security of facilities is contained in [UFC 4-010-01](#), *DoD Minimum Antiterrorism Standards for Buildings* and [UFC 4-010-02](#), *Design (FOUO) DoD Minimum Standoff Distances for Buildings*. These requirements are applicable for new construction, restoration, and modernization of existing facilities. Additional AT/FP guidance may be found at the following:

- [AFI 10-245](#), *Air Force Antiterrorism (AT) Standards*
- [AFI 31-101](#), *The Air Force Installation Security Program (FOUO)*
- [AFI 31-203](#), *Security Forces Management Information System (SFMIS)*
- [USAF Installation Force Protection Design Guide](#)
- [DoD Directive \(DoDD\) 2000.12](#), *DoD Antiterrorism/Force Protection (AT/FP) Program*
- [DoD Instruction \(DoDI\) 2000.14](#), *DoD Combating Terrorism Program Procedures*
- *EUCom Operations Order 03-11 with FRAGO (07 Jul 04)*

2-8 **SUSTAINABLE DEVELOPMENT**

Sustainable design shall be an integral part of every project in accordance with Executive Order 13123, *Greening the Government Through Efficient Energy Management*. Use an integrated approach to the planning and design of aquatic facilities that minimizes energy consumption and optimizes life cycle costs. A practical combination of site selection and siting, energy conserving building envelope technologies, energy efficient lighting, occupant sensing controls, variable frequency drives for motors and exhaust fans, and high efficiency HVAC systems should be used to achieve this goal. Incorporate renewable energy principles, such as day lighting, passive and active solar heating, natural ventilation, and photo-voltaics where they are life cycle cost effective. Spray grounds should be on a recirculation system or should capture used water for use in irrigation or similar purposes requiring non-potable water. Utilize pool covers over the water for heated and unheated pools to help reduce heating costs and the loss of chemicals due to exposure to the elements. Consider utilizing geothermal heat sources for heating pools where easily accessible, co-generation (the simultaneous generation of electric power and useful heat), and time-controlled circulation to save electricity during inactive periods.

2-8.1 **Air Force Sustainability Requirements**

It is Air Force policy to apply sustainable development concepts in the planning, design, construction, environmental management, operation, maintenance, and disposal of facilities and infrastructure projects that are consistent with budget and mission requirements. Each Major Command should incorporate sustainable development using Leadership in Energy and Environmental Design (LEED™) criteria as defined by the [United States Green Building Council](#) (USGBC). The [Air Force Sustainable Facilities Guide](#) provides tools, suggested guidelines for selecting candidate projects,

and complete AF sustainable development policies. The goal is to have all MILCON/NAF projects in the fiscal year 2009 (FY09) program capable of achieving LEED™ certification. Submission to the USGBC for actual LEED™ certification is at MAJCOM discretion. This policy does not apply to host nation or NATO funded projects.

Sustainable development concepts will benefit the Air Force by creating high performance facilities with long term value. They should be integrated into the development process and balanced with all other design criteria to achieve the best value for the Air Force. The economic analysis process need not change, but the elements to consider will now include sustainable technologies and their potential for long term savings.

2-8.2 Energy and Water Conservation

New construction and renovation of existing facilities must comply with the minimum standards for energy and water conservation established in [UFC 3-400-01, Design: Energy Conservation](#). Design of new facilities must ensure that building energy consumption does not exceed the [Department of Energy](#) (DoE) energy budget figures. Care should be taken to balance indoor air quality issues with energy conservation goals.

2-9 ENVIRONMENTAL ISSUES

Aquatic facilities have specific environmental considerations, such as backwashing of filters and the disposal of waste water. The disposal of all chemically treated water shall be in compliance with local code requirements. Safe provisions shall be incorporated for the storage and handling of chlorine gas and other chemicals. [AF Form 813, Request for Environmental Impact Analysis](#), must be completed and submitted to the Civil Engineer Squadron Environmental Flight at each installation after the submission of AF Form 332. Refer to [AFCESA Engineering Technical Letters](#), local codes, and base level environmental policies regarding large volume water discharge into sanitary sewer or storm sewers. Additional environmental information and up-to-date information regarding integrated “whole building” design techniques and technologies may also be obtained from the [Whole Building Design Guide](#) which further explains the environmental issues related to building materials and provides technical guidance on green building material selection.

2-9.1 EPA Guidelines

When specifying products that are included in the Environmental Protection Agency's (EPA) list of affirmative procurement guideline items, A/Es must include the requirements for these products to meet or exceed the recycled material content standards established by the EPA. The list of products and their corresponding recycled content requirements are found at www.epa.gov/cpg/products. Listed products likely to be used include building insulation, furniture and cushions, cement and concrete, latex paint, floor tiles, restroom dividers, and structural fiberboard.

2-10 **COST ESTIMATING**

Cost estimating procedures must follow the guidance given at the [AFCEE](#) and [AFCEA](#) websites. The following special factors should be accounted for when establishing initial estimates of project costs, in addition to the usual cost estimating considerations. See relevant sections of [Chapter 3](#) and [Chapter 4](#) for a discussion of specific design requirements for each factor. Provide preliminary soils analysis to determine whether high site work and foundation costs will be required. Local wind, snow, permafrost, seismic activity, tornados, hurricanes, floods, and other weather conditions must be considered for their impact on project costs. Consider the costs for meeting seismic requirements. Conceal conduit and fiber-optic LAN wiring, yet provide easy access for continuous upgrading.

2-11 **MODIFICATION OF FACILITIES AND EQUIPMENT**

Consider existing facilities and their limitations with regard to meeting the needs for aquatic facilities at each installation.

2-11.1 **New Code Compliance**

All new pool construction and renovations to existing pools must conform to current local, state, federal, and host nation codes, if applicable.

2-11.2 **Renovation and Repairs**

Leaking pools and plumbing systems are major factors that may require significant renovation and repairs. Consider low capital investment options to repair leaking pools, such as vinyl liners. Old-style gutter systems may be replaced with new stainless steel gutter systems by sawing the existing concrete to create a step for the new drop-in gutter system. New gutter systems may be designed to handle the surge capacity requirements of existing pools that can eliminate the need for the existing surge tank system and underground plumbing that leaks.



Attempted Vinyl Liner Restoration



Restored Deck and Gutter System

2-11.3 **Restoration and Preservation**

Many older AF aquatic facilities may require restoration of pool and deck surfaces. Cost comparisons should be used to determine if restoration or replacement is the most appropriate option.



Concrete and Gunite Restoration



Ceramic Tile Restoration

2-11.4 **Upgrades and Additions**

Improvements to existing aquatic facilities may include the replacement of wading pools with spray grounds and the addition of amenities detailed in this UFC. Adding additional water areas to existing pools usually involves major construction and expense. Most upgrades to existing facilities will involve new gutters, surge control systems, and circulation/filtration systems.



Consider the Addition of Waterfalls and Other Water Features



Consider Adding Fountains and Play Equipment



Play and Shade Structure for Children



Spray Grounds and Play Equipment

CHAPTER 3

GENERAL DESIGN GUIDELINES

3-1 GENERAL

Chapter 3 provides general design and material guidance, including detailed requirements for the site, infrastructure, water areas, pool deck, bathhouse, and other buildings or structures. The focus of this information is for aquatic facility specific issues. General professional knowledge with which A/Es are familiar is not addressed. These guidelines address design considerations for site and building layout, architectural character, function, circulation, and facility systems. Information is provided regarding the preferred materials and finishes that deliver the required durability, yet are still functional and aesthetically pleasing. Functional diagrams and other guidance regarding potential layout configurations for different styles of aquatic facility design are provided to illustrate how the core functional areas could potentially be organized.

Facility systems information is also provided regarding circulation, filtration, chemical storage, structural considerations, HVAC systems, plumbing, electrical, fire protection, life safety, communications, audio/visual systems, alarm/security systems, and acoustical requirements. Special considerations for operational requirements, installation-specific programs, and the renovation of existing facilities are also addressed to help facilitate the preparation of construction specifications and contract documents which meet or exceed the [AFSVA Golden Eagle Standards](#) for aquatic facilities.

3-1.1 Design Development

In addition to complying with the general criteria, proposed designs shall provide a compatible solution for the specific project requirements. An individual design is required for the specific site that enhances the surrounding built environment and natural character of the base. Other factors that determine the success for the design include:

- **Value and Cost:** The design must result in a complete facility that can be constructed within the project funds and maintained economically.
- **Operating Efficiency:** The individual spaces shall be thoughtfully arranged to meet specific needs of the user population and allow for maximum efficiency of staff utilization.
- **Project Cost:** The design shall be guided by considerations that reduce construction and operating costs. If possible, reduce the floor area below the allowable limit by using a compact plan that minimizes floor area for circulation, walls, and structure. Structural, architectural, and mechanical costs can be reduced with a compact building volume and careful placement of mechanical and filter rooms to reduce the length of “runs.”

- ***Simplified Construction:*** Use familiar building assemblies and terms that do not require a specially qualified labor force or special construction equipment for installation. Include durable, water-resistant materials that have a low life cycle cost. Minimize the number of different materials used and select materials that are locally available. Consider the use of pre-engineered building systems where they are locally available and architecturally compatible with the base building standards. Utilize systems that can be supplied and maintained economically, especially for natatoriums.
- ***Energy Management:*** Operating costs for natatoriums can be reduced by applying the principles of passive solar design, optimizing the effective use of insulation based on a life cycle study, and using fuels that can be provided economically for the life of the facility.
- ***Environmental Influences:*** Designs shall be suited for the specific climate of each base. The large majority of AF pool facilities are a combination of unheated outdoor pools and bathhouses that are not air conditioned. Consequently, many environmental considerations should focus on the control of sunlight and wind by shading, tunneling, blocking, or otherwise manipulating these two elements.

3-1.2 General Design Process

Design drawings and data are submitted in a series of stages, typically including concepts, early and regular preliminaries, and final working drawings. Based on the space program defined in [Chapter 2](#), general guidance for the design phase is addressed as part of this chapter. [Chapter 4](#) provides detailed design guidance for each functional area. Concept designs should conform to the design considerations provided in this chapter. Preliminary and working drawings should address this information, plus the specific space criteria, technical issues, and functional area requirements provided in [Chapter 4](#). The illustrative designs in [Appendix B](#) help explain the programming and design guidance of the preceding chapters through example application to prototypical site plans and bathhouse floor plans.

3-2 SITE DESIGN

Site the aquatic facility so that the main entrance is clearly visible and the architecture provides intuitive wayfinding cues to guide visitors to the main entrance and throughout the facility. Preserve and utilize natural site features, such as topography, trees, greenery, and rock outcroppings to help define the site and accent the building. Use landscape elements to provide definition, screening, and focus for the site. Locate the pool, spray ground or wading pool, bathhouse, and outdoor recreational areas to reflect local climate and micro-climate conditions. For security and supervision purposes, the main entrance is the single point of entry and egress for customers, except for alarmed emergency exits. Provide adequate shading if check-in area is outdoors.

3-2.1 External Circulation

The external circulation system shall consist of an access road, vehicle drop-off, parking lot for staff and customers, connections to on-site walkways, service drive with gate for easy access to the circulation/filtration equipment and chemical storage, and ambulance access to the pool deck. Provide a loop road or similar drop-off area in front of the aquatic facility that will accommodate buses and vans. Consider a one-way, double-lane width drop-off area to allow loading and unloading of buses and vans, yet still allow privately owned vehicles (POVs) to pass and drop-off or pick-up customers. Locate bus stops and shelters conveniently near the aquatic facility with direct sidewalk access to the main entrance. Paths or walkways leading into the pool area must be paved with concrete, asphalt, pavers, brick, stone, or other hard surface to eliminate "tracking" of loose materials onto the pool deck. Provide a service drive for access to pool equipment and chemical storage that may also be used by emergency vehicles for convenient access by emergency personnel to the pool area. Provide a concrete apron for garbage dumpsters and recycling containers adjacent to the service drive.

3-2.2 Parking

The number of parking spaces required shall total one for every five customers at peak capacity, plus one for each full time staff member. Provide 37 sq. meters (400 sq. feet including circulation) for each regular parking space and more as required for accessible spaces. Provide handicapped accessible parking spaces per the accessibility references identified in [Section 2-5, Accessibility](#). Refer to [AFH 32-1084](#) for detailed information regarding the parking space requirements.

3-2.3 Building Access

Provide clearly identified pedestrian and handicapped access to the main entrance according to the accessibility requirements identified in [Section 2-5, Accessibility](#). Reinforce connections to related base facilities with clear, direct pathways. Provide separate vehicular access for a main entrance drop-off area and for the service/emergency vehicle entrance.

3-2.4 Zoning

The pool deck, associated pools, spray grounds, sunbathing, recreation, and food service areas should be zoned for maintenance and safety. Children's play areas, spray grounds, and wading pools should be segregated from the main pool by low fencing to ensure against wandering children. Training pools (if utilized) should also be separated by low walls or fencing. If spectator seating is provided, it should be segregated by low, see-through fencing and provided with a separate entrance from an external pedestrian walkway system. Food service areas may or may not be fenced, but should be carefully designed to respect desired operating policies.

3-2.5 Landscaping

The use of deciduous trees and plants should be minimized around an outdoor pool in order to minimize deck and pool maintenance. Deciduous trees are acceptable in picnic or play areas, but in no case should their drip line extend over the pool deck. Evergreens and shrubs can be beneficial as wind screens or visual barriers. Grass areas for sunbathing inside the pool complex are always appreciated by bathers, but must be designed to minimize "tracking" of grass clippings onto the pool deck. Utilize

indigenous plants and trees that are appropriate for the climate and the local base conditions. Do not utilize bark mulch, small rocks, or similar ground covering materials near the pool deck or in areas where these materials may get washed into the pool or scattered about the pool deck area.

Landscape plantings can dramatically improve the first impression of a facility and can also help control erosion, but varieties that shed plant materials should be avoided. Landscaping may also be utilized to create stand-off distances required for effective AT/FP measures and to create buffer zones around the facility. In some instances, landscaping may also reduce maintenance requirements. Follow sustainable design principles for xeriscaping and low water usage plant design and consider utilizing used water for irrigation purposes. Never use poisonous or toxic plants. Refer to the [USAF Landscape Design Guide](#) for additional information regarding landscaping.

3-2.6 Site Signage

An exterior signage system should be developed in accordance with [UFC 3-120-01](#), *Air Force Sign Standard*. Exterior sign programs should be coordinated with the exterior design of the building and local base standards. Facility identification signs may be freestanding signs located near the main vehicular entrance to the facility or signage attached to the building. Site signs should also identify the dedicated parking areas, service areas, accessible entrances, and other facilities for the disabled. Provide information regarding the facility's hours of operation and force protection condition (FPCON) on exterior signage located near the main entrance that is visible to customers from their cars. Include AFSVA identification and branding signs, where appropriate, according to the guidelines provided in the current *Services Signage Enhancement Program*.

3-2.7 Sunlight and Glare Control

Outdoor aquatic facilities require special consideration to minimize excessive sunlight and control the effects of glare on customers and staff. Provide accommodations for moveable lifeguard stations that can be easily relocated throughout the day to minimize glare on the water from sunlight or night lighting. Shade provisions must be available for children's areas, customers on the pool deck, lifeguard stations, food service areas, and for staff members at the check-in area and administrative areas. Provide shade accommodations at each lifeguard station and consider the need for additional shade for portions of the pool area.

3-2.8 Site Lighting

Provide exterior lighting for pool, deck areas, recreation areas, parking areas, and walkways utilizing high intensity discharge light sources. Ensure that parking areas and the facility have adequate lighting for safety, evacuation, and security measures. General artificial illumination of the parking lot shall be one foot candle as measured at pavement level. The public entrances shall have auxiliary flood lighting to raise levels to 20-foot candles as measured at the ground plane. Provide incandescent, low brightness exterior lighting, as required, for walkways and pool deck areas. Refer to [Section 3-3.11](#) for detailed specifications for pool deck and underwater lighting.

3-3 WATER AREA DESIGN

Water areas include swimming pools, diving pools, wading pools, spray grounds, and all spaces or equipment within these areas.

3-3.1 Pool Size and Capacity

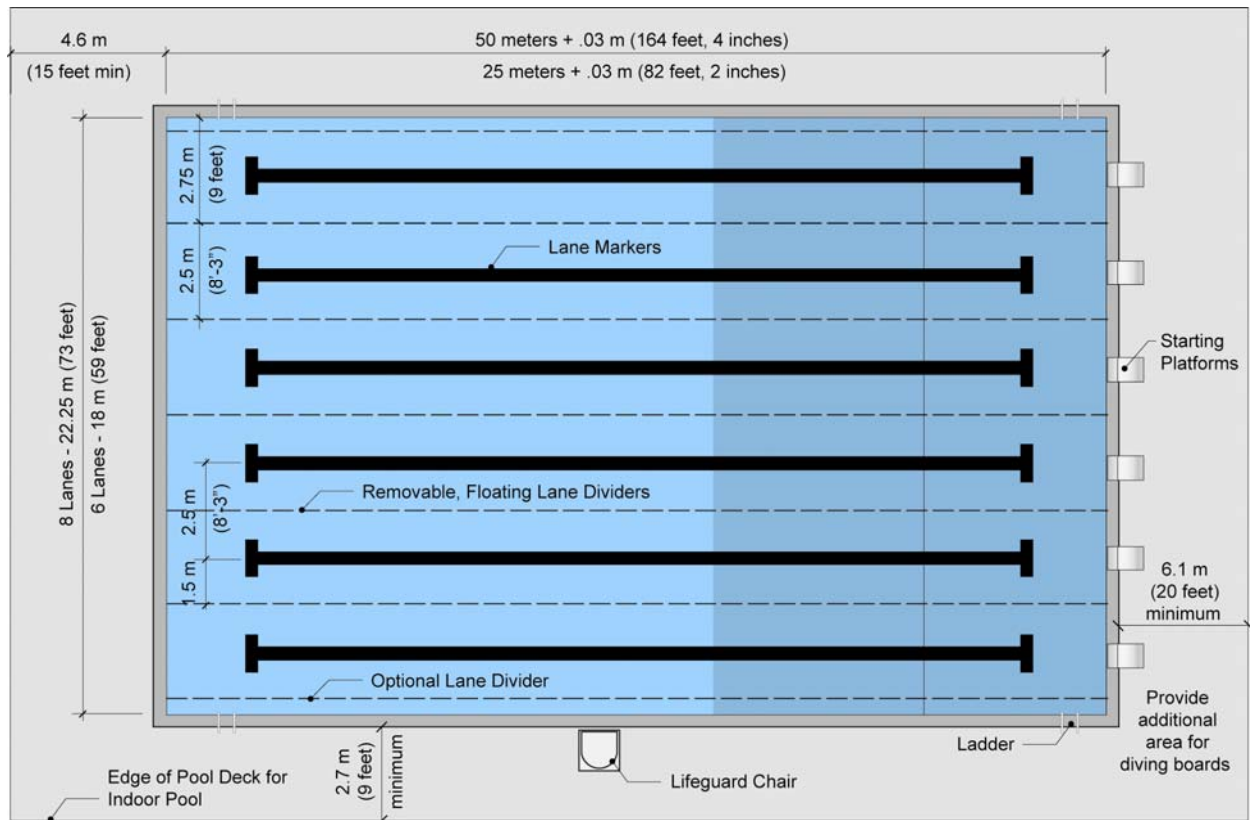
The maximum allowable pool size is determined by [AFH 32-1084](#). Given the water surface area, the safe capacity is determined by allowing 1.4 sq. meters (15 sq. feet) for each person at less than 1.5 meters (5 feet) of water depth, and 2.3 sq. meters (25 sq. feet) for each person at more than 1.5 meters (5 feet) of water depth. The size of general use pools depends upon the unique program requirements at each installation. General size guidelines for standard pool configurations include the following:

3-3.2 General Use Pool Size Standards

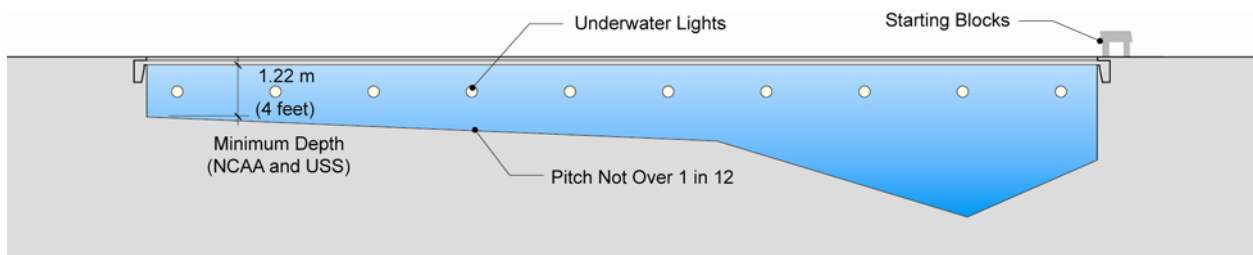
General use pools are commonly utilized for lap swimming, competitive swimming, free swimming, and recreational or instructional activities.

- Typical Pool Lengths: 25 meters (82 feet, 2 inches) or 50 meters (164 feet, 4 inches). Note that competitive pool lengths should include an additional .03 meters (one inch) to compensate for possible future tile facing, structural defects, and electrical timing panels.
- Typical Pool Widths: Six lanes – 18 meters (59 feet), eight lanes – 22.25 meters (73 feet).
- Standard Lane Widths: Interior lanes – 2.5 meters (8 feet, 3 inches), outside lanes – 2.75 meters (9 feet).
- Typical Pool Depths: 1 to 1.5 meters (3 to 5 feet), except for diving areas. Pool depth requirements vary depending upon different levels of competition and the intended use or programs anticipated.

3-3.2.1 **Figure: Example General Use Pool Layout**



3-3.2.2 **Figure: Example General Use Pool Section**



3-3.3 **Diving and Deep Water Area Standards**

The minimum water depth beneath a 1-meter diving board is 3 meters (10 feet) for at least 6 meters (20 feet) out from the end of the board. The minimum water depth beneath a 3-meter diving board is 3.6 meters (12 feet) for at least 6 meters (20 feet) out from the end of the board. No more than 10 divers should be allowed per diving board. The minimum area requirements for diving activities in standard 25-meter general use pools containing one 1-meter diving board and one 3-meter diving board include the following:

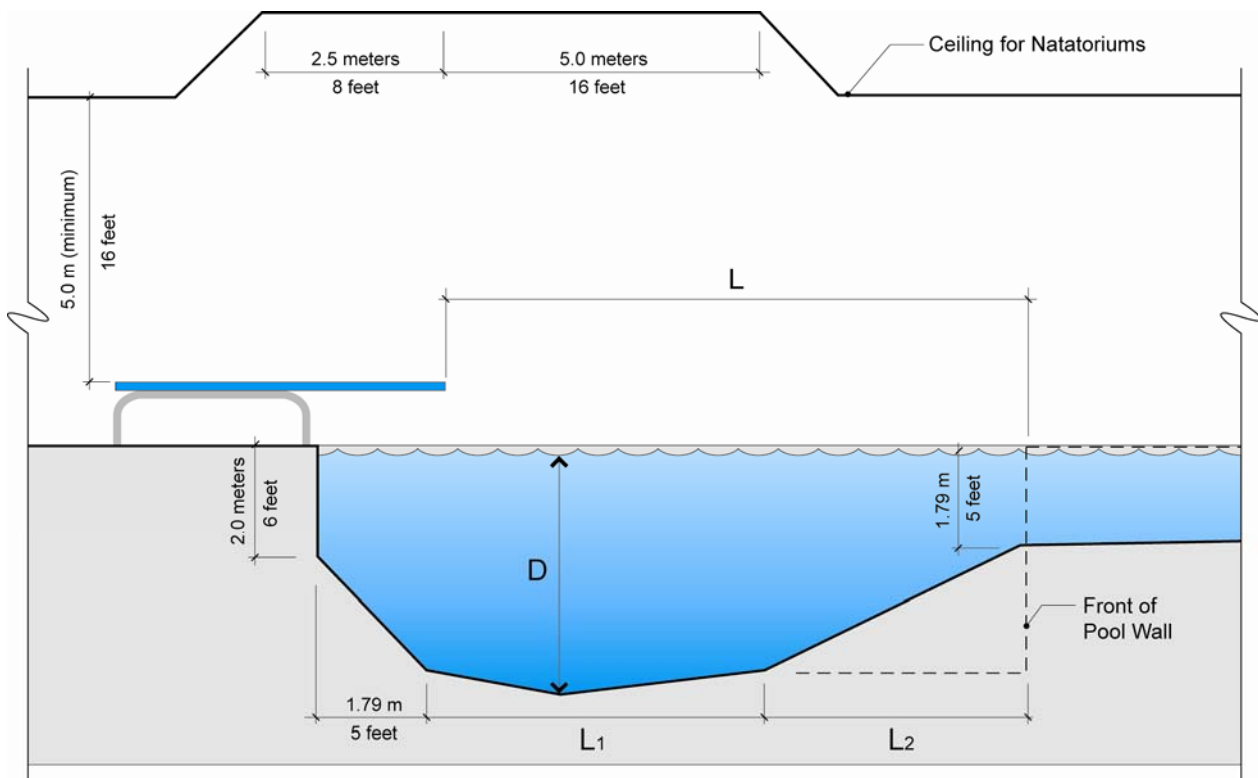
- Minimum Length: 9.7 meters (32 feet)
- Minimum Width: 9.7 meters (32 feet)

- Minimum Depth: 3.6 meters (12 feet) at deepest, bottom slope not more than 1:3

The minimum area requirements for diving activities in standard 50-meter general use pools containing one 1-meter diving board and one 3-meter diving board include the following:

- Minimum Length: 11.8 meters (39 feet)
- Minimum Width: 12.1 meters (40 feet)
- Minimum Depth: 3.6 meters (12 feet) at deepest, bottom slope not more than 1:3

3-3.3.1 **Figure: Diving Area Section Minimum Dimensions**

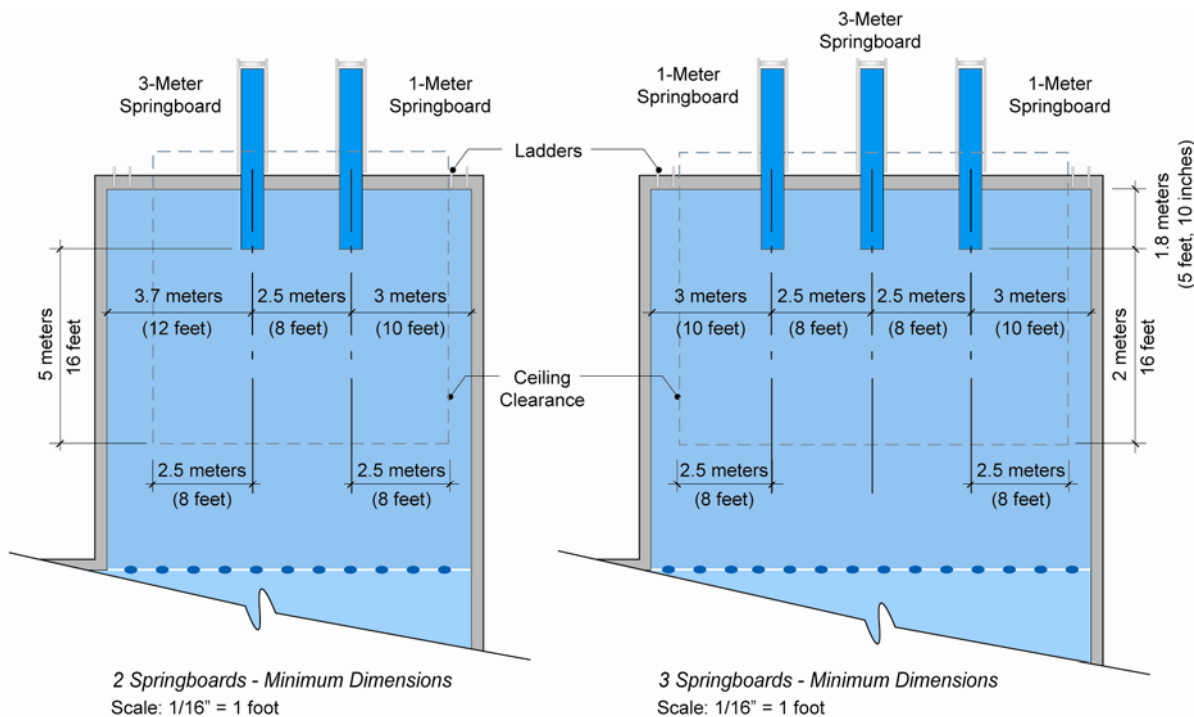


See [Section 3-3.3.2 Table: Diving Area Minimum Dimensions](#) for additional information.

3-3.3.2 **Table: Diving Area Minimum Dimensions**

	L = Distance To Pool Wall	L1 = Length of Deepest Water	L2 = Runout to 5'-0" Depth	D = Water Depth
1-Meter Springboard Height	8.8 meters (29 feet)	6.1 meters (20 feet)	2.7 meters (9 feet)	3.0 meters (10 feet)
3-Meter Springboard Height	10.4 meters (34 feet)	6.1 meters (20 feet)	4.3 meters (14 feet)	3.7 meters (12 feet)

3-3.3.3 **Figure: Diving Area Plan Minimum Dimensions**

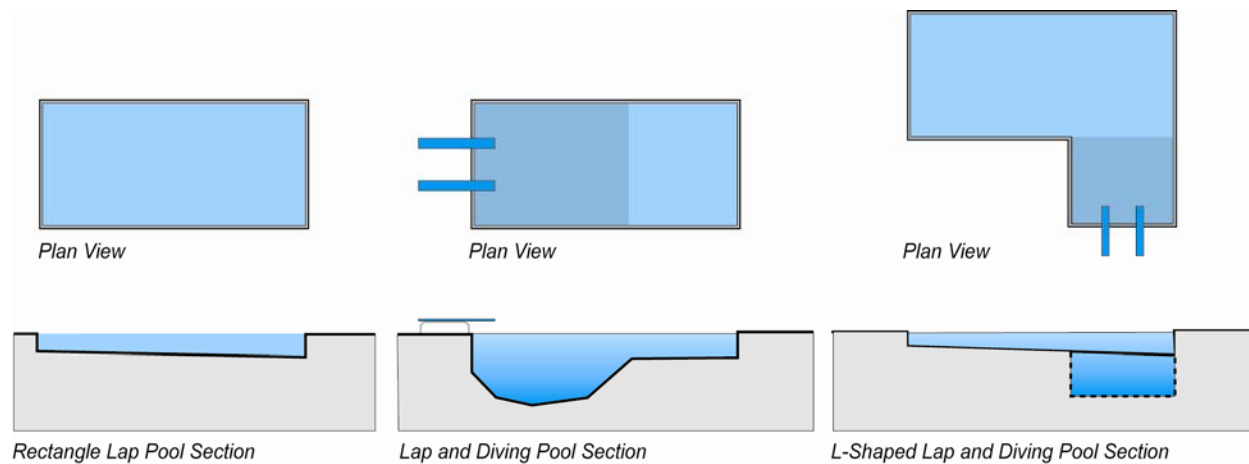


3-3.4 Shape, Slope, and Depth

The pool shape is determined by the length, which is typically 25 or 50 meters (82 or 164 feet) if it is to be utilized for competitive swimming. The width is typically determined by the number of lanes to be included. Six to eight lanes are normally recommended. The shape of the pool is affected by the placement of the diving area, if utilized. The recommended basic pool shape is a simple rectangle for free swimming, with a diving "L" placed on either side of the deep end. If the depth of water in the rectangle is held to a maximum of 1.5 meters (5 feet), the "L" shaped plan will offer the largest capacity pool. Diving may occur at the deep end of the rectangle, but is only recommended where topographic conditions, the shape of the site, or an effort to minimize the area of enclosure for a natatorium suggest deep end diving as the only means of holding the project within the budget. The shape of training or wading pools is optional with much more flexibility for unique shapes and configurations. The slope of the pool may be gradual if no diving areas are provided and one side is deeper than the

other to create both shallow and deep ends. The slope requirements for the run-out distances of diving areas depends upon the heights of the diving boards utilized and the depth of the deepest water. The ratio of the slope for diving run-out area is approximately 1:2 or 30 degrees. [Figure 3-3.4.1](#) shows three of the most common types of swimming pool configurations.

3-3.4.1 **Figure: Example Pool Configurations**



3-3.4.2 **Zero Entry Depth Pools**

Zero entry depth pools may be utilized to create a beach like, gradual entrance to the water. These pool entrances are commonly used for access to the shallow end of pool to help accommodate the needs of children and the elderly. Zero entry depth areas may also be used to address the accessibility requirements of the handicapped if the appropriate hand rails are provided. See [Section 2-5, Accessibility](#) and [Section 4-3.13, Accessible Ramps and Equipment](#) for additional information.



Zero Entry Depth Pool Access



Zero Entry Depth Pool Access

3-3.5 **Pool Construction**

Of the many types of pools available, the only four recommended for AF use include:

- Poured concrete
- Gunitite (sprayed concrete)

- A combination of gunite with a metal gutter system
- Metal (aluminum or stainless steel)

These four methods increase in durability (as well in cost) in the above order. The normal lifespan of a concrete pool is between 11 and 25 years. Considering budget and durability, a gunite pool with a metal gutter system is recommended for normal AF use. This type of pool is far cheaper than a metal pool and outlasts a concrete or gunite pool because the metal gutter system is placed at the point of maximum wear. This type of construction provides not only an integral continuous overflow perimeter gutter system, but also the majority of the pool's supply return and surge plumbing requirements.



Gunite Pool with Metal Gutter System



Metal Gutter System

3-3.5.1 **Metal Pools**

A metal pool needs no liner, but requires painting every few years. Many aluminum pools have been in place for over 25 years and show no sign of need for replacement. Only under the following circumstances is a metal pool recommended:

- Where questionable soil conditions exist
- In an area where extreme vandalism is prevalent
- Where unusual structural and/or site conditions require a lightweight, prefabricated structure

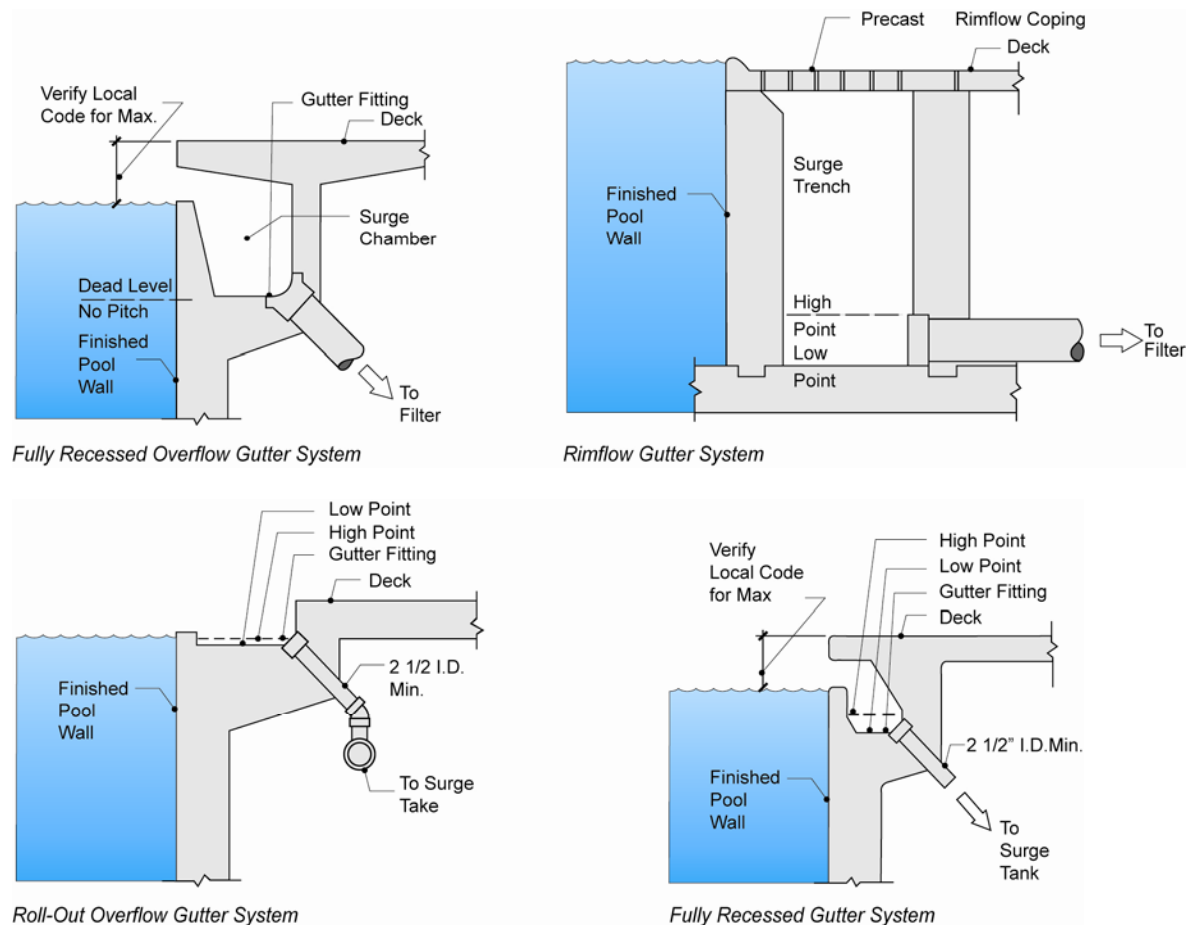
3-3.6 **Pool Finishes**

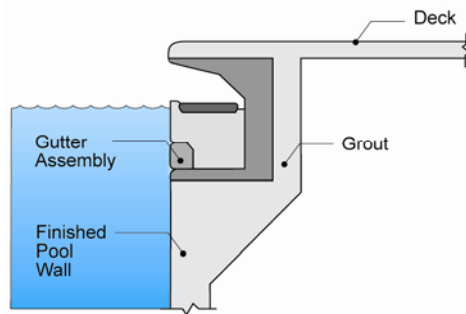
Gunite construction requires that the pool be lined with either a plaster liner (marble dust plaster or other similar material) or ceramic tile. Tile can also be used in conjunction with a plaster liner at the gutter area. Maintaining proper water balance is essential for pool tile installations. A metal pool must be painted. Metal gutter systems (usually stainless steel with plastic accessories) require no finish. For visibility and easy maintenance, the pool color should be white or light blue. The color for depth markers and racing lane stripes must be contrasting. The pool coping or gutter system should also contrast (in color) with the deck itself.

3-3.7 **Overflow Systems**

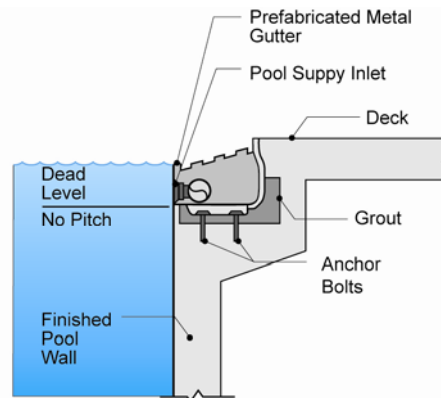
A continuous overflow perimeter system is recommended in the main pool. Examples of this system are shown in [Figure 3-3.7.1, Overflow Rim Systems](#). Prefabricated, stainless steel surge gutter systems are preferred because they provide constant skimming of the surface water to help remove debris and provide surge storage capacity for water displaced by swimmers. Scuppers that utilize a thin layer of water falling over a weir may be used to skim water from wading and training pools; however they do not adequately handle the surge requirements of main pools. Antiquated scum gutters offer little surface collection effectiveness and are generally used in conjunction with surge storage tanks and pump pits.

3-3.7.1 Figure: Overflow Rim Systems





Stainless Steel Recessed Skimmer



Prefabricated Overflow Gutter

3-3.8 Circulation and Filter Systems

All portions of the water distribution system serving the swimming pool and auxiliary facilities shall be protected against backflow. Water introduced into the pool, either directly or into the circulation system, shall be supplied through air gap fittings. There shall be no direct physical connection between the sanitary or storm sewer system and any drain from the swimming pool recirculation system. Provisions shall be made for complete, continuous circulation of water through all parts of the swimming pool by appropriately sized, non-corrosive pipes. Heavy grades of schedule 40 polyvinyl chloride (PVC) or schedule 80 in active seismic zones may be utilized for most circulation piping requirements. The valves and draining system for the pool shall be sized to prevent flooding (surcharging) of the sanitary or storm drainage system. Circulation piping shall be designed for a maximum velocity of 3.04 meters (10 feet) per second. All suction piping shall be designed for a maximum of 1.83 meters (6 feet) per second. A hair and lint filter of stainless steel with removable basket shall be provided to filter and remove leaves, hair, and other solids entering the drainage system. A centrifugal circulation pump shall be provided of sufficient capacity to provide the minimum turnover rate to the pool, plus an additional allowance of 30 percent. Minimum turnover rates shall be as follows:

- Main Pools: Six turnovers in 24 hours
- Wading Pools: Twelve turnovers in 24 hours

3-3.8.1 Recirculation System Minimum Requirements

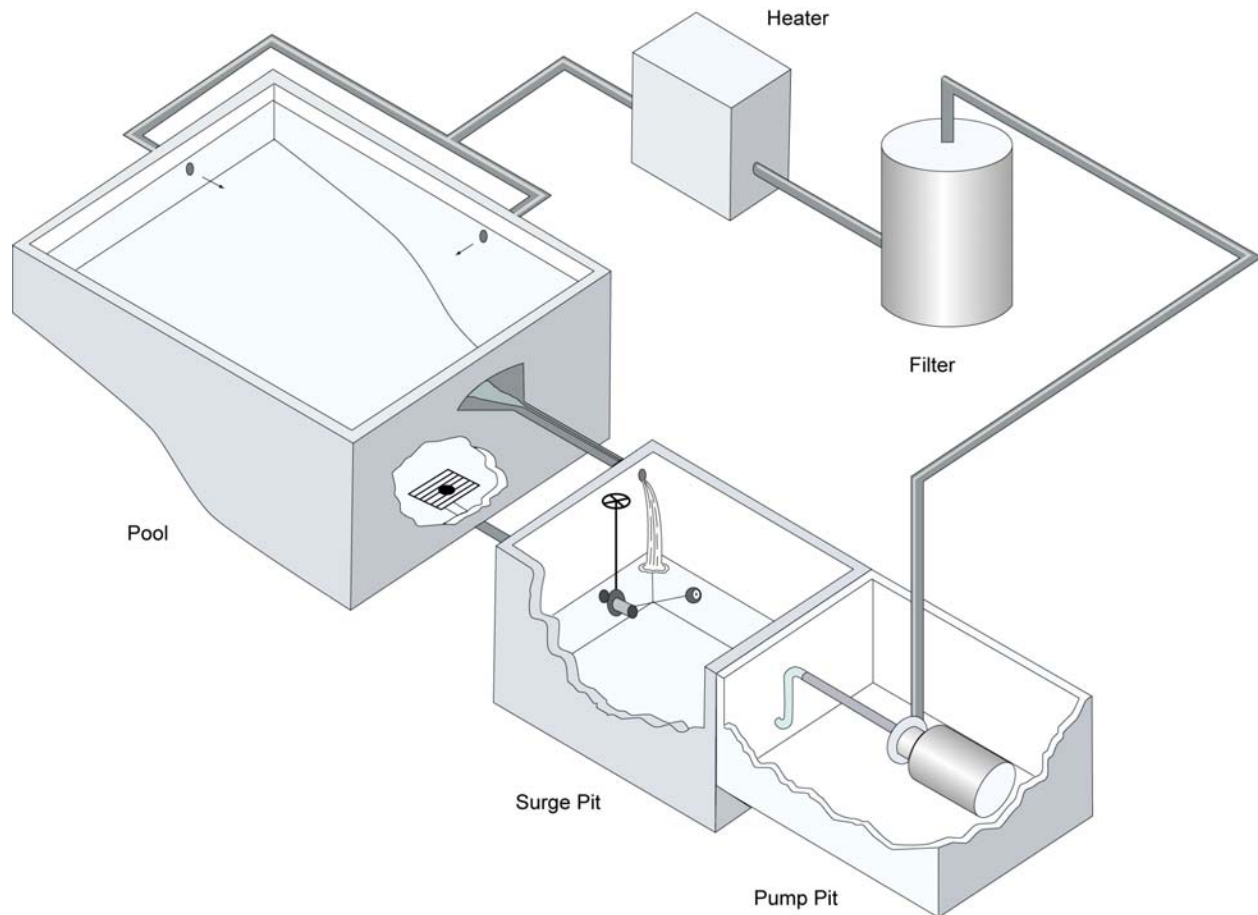
A recirculation system, consisting of pumps, piping, filters, feeders, water conditioning equipment, city water make-up, surge tank, and other accessories shall be provided to clarify and disinfect a swimming pool volume of water in six hours or less, thus providing a minimum turnover rate of four times in 24 hours. For pools subject to heavy usage, the turnover rate shall be increased to three hours. Under normal operating conditions, water shall be re-circulated from the main drain and through the overflow gutter into the circulating pumps. Approximately 30 percent of the water shall enter the main drain, while 70 percent "skims" over the gutter system through the surge tank and hence into

the pumping system. Additional information concerning swimming pool layout and recirculation requirements can be found at the [National Swimming Pool Foundation](http://www.natfpf.org) website.

3-3.8.2 Surge Tanks and Surge Control

Circulation systems shall be equipped with concrete, cast-in-place surge tanks, unless the maximum surge requirements of a pool can be handled by a surge gutter system. The purpose of the surge tank is to allow water displaced by pool occupants to be collected in the surge tank and later returned to the pool as occupancy decreases. Provide flow control valves to modulate water flow from the main drain and from the surge tank. New gutter systems may eliminate the need for surge tanks, because the displaced water may be contained within the gutter overflow system.

3-3.8.2.1 Figure: Surge Tank and Pump Pit Diagram



3-3.8.3 Motor Controls and Auxiliaries

Provide magnetic starters for the control of the circulation pump, including a stainless steel enclosure to prevent corrosion. Use non-corroding metallic components, such as aluminum and stainless steel, for all electrical and control items subject to corrosion.

3-3.8.4 Pumps

Pumps are utilized to displace a liquid or gas to create a directed flow and many different types of pumps may be required for pool equipment, such as chemical feed pumps, transfer pumps, vacuum pumps, circulation pumps, booster pumps, hydrotherapy pumps, and compressor pumps. Centrifugal style pumps are generally used for all circulation pumps that must be sized appropriately to handle the required capacity. Utilize mesh-bucket filters immediately in front of circulation pumps to protect the internal components of the pump from larger, solid objects and to strain hair and lint from the re-circulating water. A pump pit may be required adjacent to the surge tank to circulate water for filtration, heating (if required), and return it to the pool.

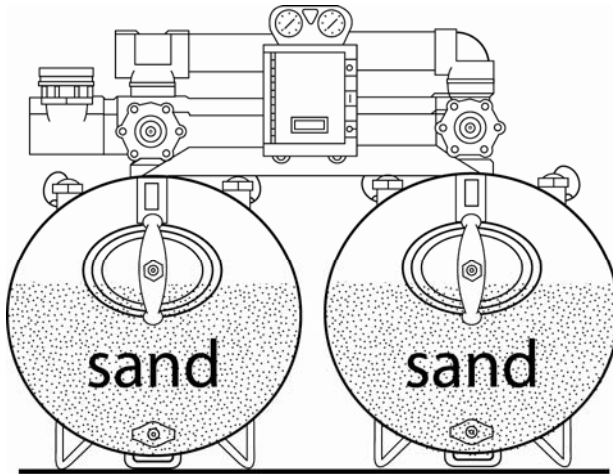
3-3.8.5 Flow Meters

Provide a flow meter in each main line serving a swimming pool or wading pool. Flow meters are also demanded by the health department codes in most states and provinces. Install flow meters on a straight, uninterrupted section of pipe at least 10 pipe diameters down-stream from the last fitting with about five diameters distance "clean run" beyond so that the smooth, linear flow is not disturbed to ensure accurate readings. In addition, provide a mercury type manometer flow meter at the discharge of the circulating pump to control primary flow and backwash. Provide a flow control valve so that the operator may manually control the circulation rate of the pump, thereby maintaining the turnover rate throughout a filter cycle from clean to dirty.

3-3.8.6 Filters

Filtration is the physical process of removing soils which would interfere or impede the disinfection process if not removed. Filters only remove solids and any dissolved elements must be removed as part of the disinfection process. The two major types of pool filters are sand filters and diatomaceous earth (DE) filters that both offer equal levels of effectiveness. Utilize high rate sand pressure type filtration banks that are [National Swimming Pool Foundation](#) (NSPF) approved because their effectiveness actually improves over time due to the buildup of trapped soil that becomes increasingly dense and resistant to water flow. Filters must be backwashed periodically according to the manufacturer's specifications and discharged directly into the sanitary or storm sewer where allowed by code.

3-3.8.6.1 **Figure: Multi-Cell High Rate Sand Filters**



Multi-Cell High Rate Sand Filters

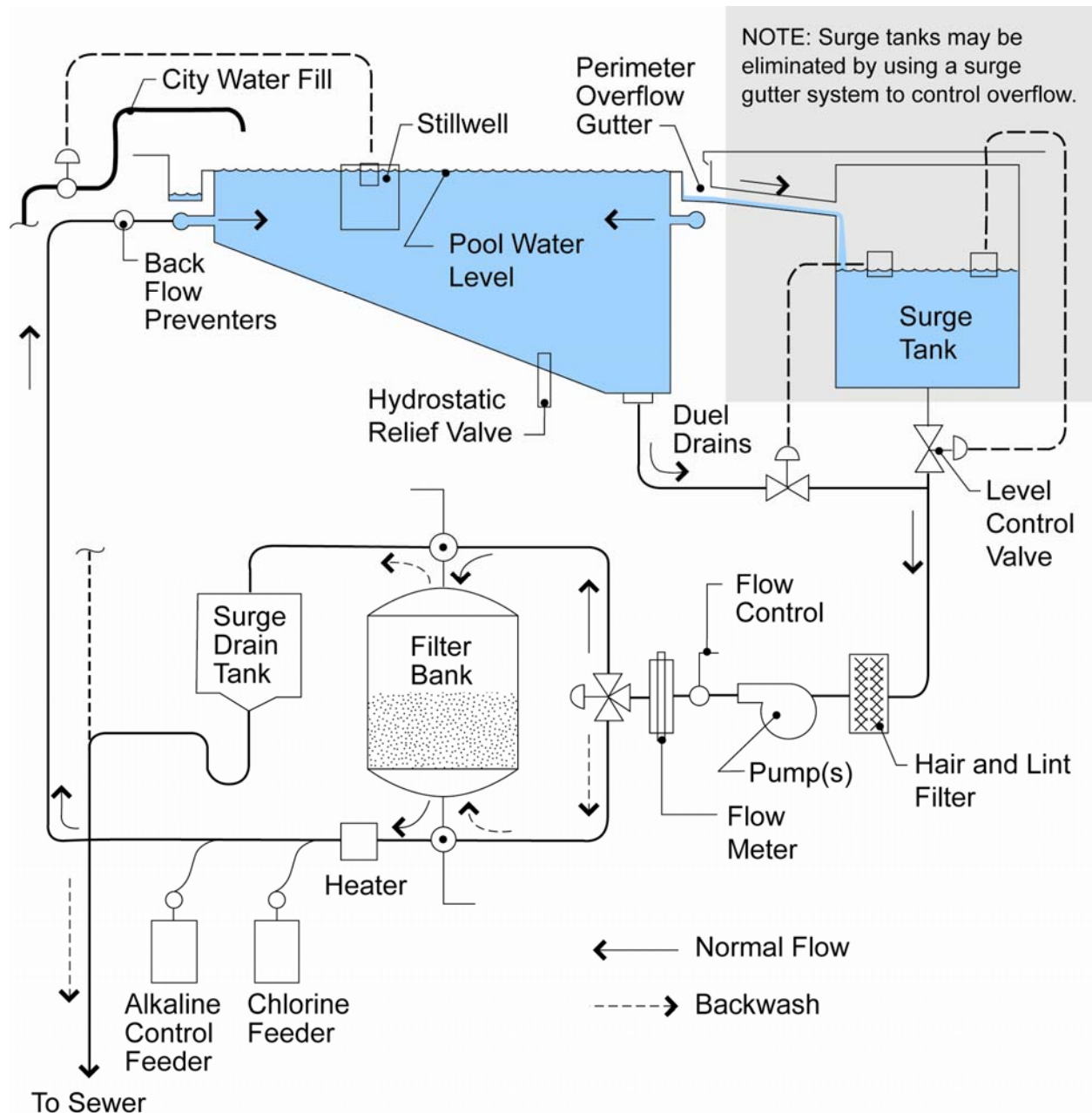


Multi-Cell High Rate Sand Filters

3-3.8.7 **Drains and Inlets**

Dual main pool drains are mandatory to prevent entrapment hazards. Inlets and drains shall not protrude into the pool or allow entrapment of extremities. Refer to the current guidance provided by the [Consumer Product Safety Commission](#) publication [Guidelines for Entrapment Hazards: Making Pools and Spas Safer](#) for information regarding the prevention of entrapment hazards. At least one main drain will be provided in the deepest part of the swimming pool. For pools at least 9.1 meters (30 feet) wide, multiple drains will be spaced no more than 4.5 meters (15 feet) from a side wall. Each drain shall have a removable but secure grate that has sufficient area to maintain water velocity at or below 450 mm (1 foot, 6 inches) per second. One inlet shall be provided for each 56 sq. meters (300 sq. feet) or 56,780 liters (15,000 gallons), whichever is greater and all inlets will be located on the pool sides or floor in a manner that completely distributes the water. Utilize butterfly, ball and globe style inlet valves made partially or completely of PVC or other high quality plastic for new pools and renovations. Fresh water may also be supplied through a fill spout at least 150 mm (6 inches) above the pool deck. To prevent injuries and to slightly disturb the water for better diver visibility in the diving area, this spout shall have no sharp edges and be located under one of the diving boards.

3-3.8.8 **Figure: Water Circulation Systems Schematic**



3-3.9 Heating and Water Temperature

Water temperature shall not be more than -13°C (8°F) below air temperature nor more than -17°C (2°F) above air temperature. Heaters are necessary for all indoor pools and may be desired for outdoor pools where the climatic conditions warrant their use. Water temperature of 27°C (80°F) is desired, except when the air temperature is 32°C (90°F) or above; then a maximum of 24°C (74°F) is suggested. The selected water heater shall have the capacity to bring the pool up to the desired temperature within 24 hours. Consider the need for a solar blanket to cover heated pools to help conserve energy.

Federal guidelines and local codes require the use of solar blanket pool covers in many areas if a fossil fuel heater is utilized.

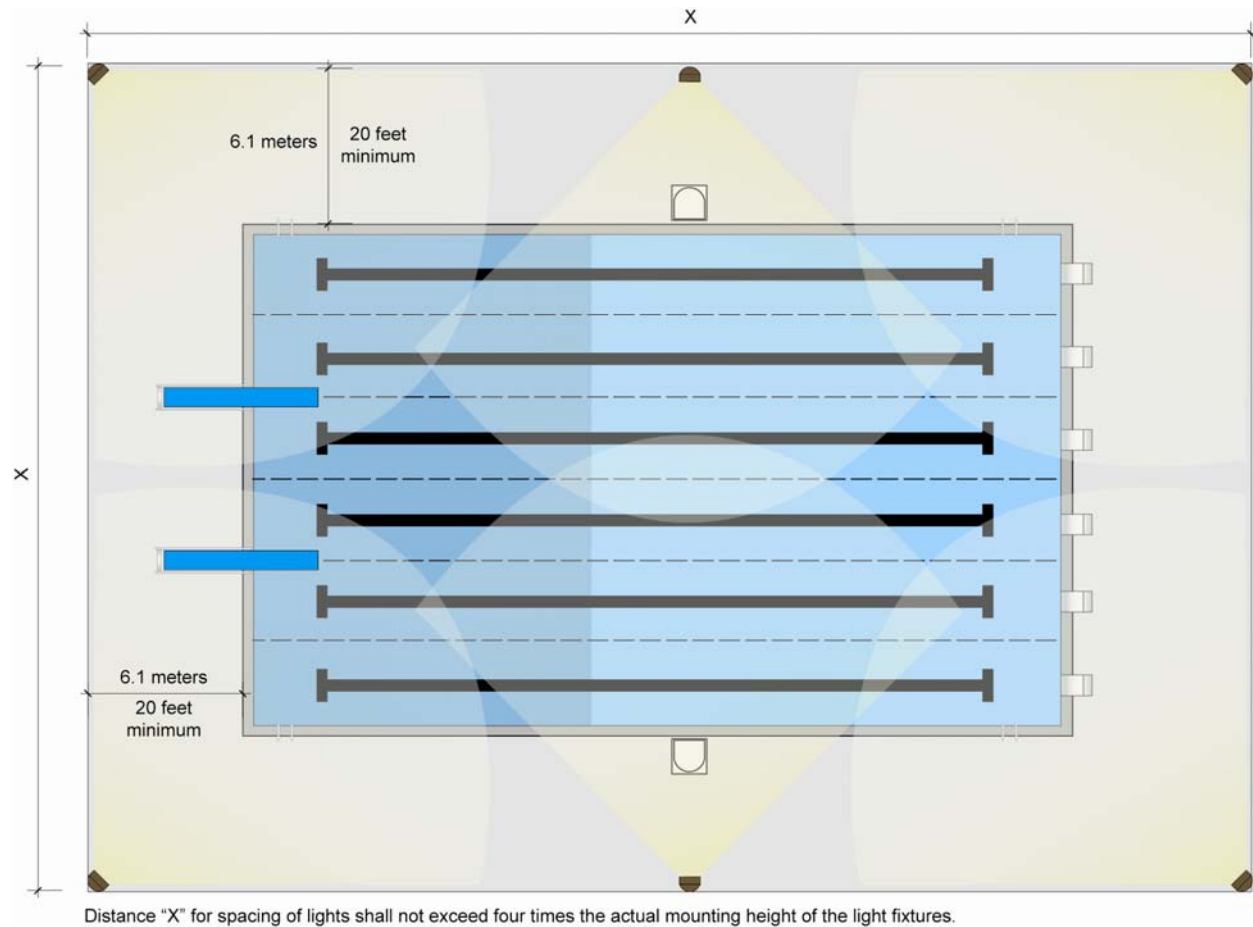
3-3.10 Water Quality

The design and method for pool disinfection must be coordinated with the base bioenvironmental engineer. Use of chlorine gas, although cost effective and efficient, as a disinfectant in swimming pools is discouraged due to safety issues and the availability of less dangerous disinfectants (e.g., sodium hypochlorite, calcium hypochlorite). When economical, consideration should be given to the use of sodium hypochlorite generators that produce disinfectants from sodium chloride (salt). Ozone generators may be used in outdoor pools and spas to reduce chlorine demand; however, minimum free available chlorine residual requirements of [AHFOSH 48-14, *Swimming Pools, Spas and Hot Tubs, and Bathing Areas*](#) must still be maintained. Use of ozone systems will require additional space for mechanical and equipment areas. Use of ozone is prohibited for natatoriums.

3-3.11 Pool Lighting

Both area and underwater lighting are required for all pools. Surface lighting will provide at least 30-foot candles (323 lux) of illumination on the deck and pool area. Overhead flood lights should be mounted at least 6.1 meters (20 feet) above the water surface. Select flood lighting lamps to allow 1 watt per square foot minimum. Consult the specific requirements of the appropriate regulatory agency if competitive swimming events will be conducted. USS rules for championship meets require a minimum of 40-foot candles of illumination 1 meter (3 feet) above the water. For nighttime or indoor competition, 100-foot candles (1.076 Kilolux) are necessary at start and turning ends. Area lighting should be designed to reduce direct glare and reflections on the water surface. Outdoor fixtures shall be daylight corrected, full spectrum, fluorescent or high intensity discharge (HID) type. Ground fault circuit interrupters (GFCI) are required for all electrical equipment (vending machines, pool lights, water coolers, etc.). Provide power sources for additional lighting that may be needed for television, movies, and special events.

3-3.11.1 **Figure: Overhead Flood Lighting Criteria**



3-3.11.2 **Underwater Lighting Criteria**

Underwater lighting types and dimensions shall conform to the National Electric Code (NEC) Article 680 regulations. Underwater lights require 0.5 to 2.0 watts per square foot of water area and should be sized accordingly. Box connections for dry or wet niches should be a minimum of 1.22 meters (4 feet) away from the side wall of the pool and 200 mm (8 inches) above the deck. Underwater light fixtures are available at standard voltage (120 volts), and at low voltage (12 volts). Low voltage wiring should be used for all dry or wet niche lighting fixtures. This requires a transformer located, by code, a specific distance away from the pool wall and above deck. Either wet niche or dry niche fixtures may be used as described in [Table 3-3.11.3, Underwater Lighting Criteria](#). If lights are provided at the start and finish ends of a pool used for competitive events, provide a turn-off switch for racing.

3-3.11.3 **Table: Underwater Lighting Criteria**

	Description	Installation Technique	Installation Depth	Servicing Technique
Wet Niche	Completely sealed but removable fixture that is constantly surrounded by water.	Mounted into recess in pool wall.	Maximum depth of 6100 mm (2 feet) from pool water surface.	Extra rubber covered electrical cord is coiled in the niche. Fixture is removed from niche and lifted to deck for servicing.
Dry Niche	Permanently enclosed fixture that doesn't come into contact with water.	Installed behind pool wall and covered by glass sealed to a metal frame with gaskets.	Can be installed at any depth, usually 6100 mm (2 feet) below shallow water surface.	Serviced via a pipe tunnel or manhole behind the pool wall.

3-4 **POOL DECK DESIGN**

The hard surfaced areas around pools serve as a circulation system and lounging area for pool users. Shaded areas on the pool deck are very important to provide some protection from the sun for customers and staff. Optional amenities, such as concession areas and spectator seating areas, may require additional deck space to accommodate the desired programs. Consider utilizing a poured soft deck surface for spray grounds and around wading pools (if provided).

3-4.1 **Deck Size and Capacity**

The deck area normally required for outdoor pools is two to three times the pool water area. Spray grounds for children are usually located on the pool deck and additional space may be required to accommodate these areas. Less deck space is required for natatoriums and is normally .75 to 1.5 times the pool water area.

3-4.1.1 **Table: Minimum Clear Pool Deck Widths**

	Indoor Pools	Outdoor Pools
Sides	2.7 meters (9 feet)	3.6 meters (12 feet)
Shallow End	4.6 meters (15 feet)	6.1 meters (20 feet)
Deep End	6.1 meters (20 feet)	6.1 meters (20 feet)

3-4.2 **Slope and Drainage**

The pool deck shall be configured and sloped so that water on the deck (either from pool overflow, splashing, rain or surface water run-off) is not allowed to flow into the pool. A minimum slope of 6 mm (1/4 inch) is required. Deck drains shall be placed to minimize puddling on the deck. Natatorium designs should include adequate drainage to prevent water from puddling at the base of exterior walls when it drains away for the pool. The existing slope and drainage of the pool deck should be a primary consideration during the design of an enclosure for an existing outdoor pool.

3-4.3 **Materials and Surface Finishes**

Pool decks shall be constructed of an impervious material, such as concrete, bluestone, glazing tile, or other hard, non-slip surface. The 3.05 meter (10 feet) perimeter area around the pool is considered a wet area and should be textured to prevent slipping when wet. All areas shall be pitched to provide positive drainage away from the pool with a slope of 6 mm (1/4 inch) at a minimum. Water depths and "No Diving" signs that are integral to the deck surface shall be placed at the pool edge and inside the pool.



Non-Slip Deck Material



Concrete Deck Surface

3-4.4 **Spectator Seating**

Seating for spectators shall be provided, as needed, according to the program requirements. The anticipated peak number of spectators shall be accommodated. For a small number of spectators at a family type recreational pool, a raised panel or pavilion is sufficient. Consider the need for portable, retractable seating for up to 600 people that can be rolled for convenient storage or moved for use at other sport facilities on base. For larger numbers, the following guidelines are suggested:

- Bench seating with 610 mm (2 feet) of length provided for each spectator.
- Provide .55 to .74 sq. meters (6 to 8 sq. feet) of space for each spectator.
- Provide access from a pedestrian path outside of the pool area for visitors attending events. Spectator seating areas shall be fenced off from the pool. There shall be a see-through fence and lockable gate between the bleachers and the pool deck to keep spectators away from competitors.
- Locate spectator seating parallel to the racing lanes in the pool.
- Permanent bench seating shall be constructed from concrete, wood, non-corrosive metal (aluminum), or recycled plastic. Temporary or movable bench seating should be metal specifically designed for sporting events.
- Spectator seating shall be stepped in elevation to allow maximum visibility.
- Provide full or partial shading options in the spectator seating area.

3-5 **BATHHOUSE AND NATATORIUM DESIGN**

Few design limitations exist for the bathhouse, natatorium, and other support buildings. Structures and finishes must be capable of resisting corrosion from moisture and chemical vapor, but many structural systems will fulfill this requirement. Natatoriums and bathhouse structures pose opportunities for interesting geometry, lighting, and material use. Both interior and exterior walls should be masonry construction with brick, composite material siding, metal panels, stucco, or similar materials that are architecturally compatible with the installation specific guidelines. All surfaces shall be moisture and mildew resistant and easily cleanable. Dressing rooms, shower rooms, drying areas, and toilets shall be considered wet areas. All walls and floors in wet areas shall be impervious to water and able to be hosed down for cleaning. Wet area floors shall be non-slip, pitched to floor drains, and shall have coved bases at walls and equipment bases. Consider the need to provide elevated concrete pads for lockers and other equipment to facilitate cleaning and help eliminate the corrosive effects of frequent expose to water.

3-5.1 **Natatorium Design**

The basic challenge for enclosing pool areas is to economically span the required height and distance for pool and deck width with moisture resistant materials, such as concrete, galvanized steel, laminated wood, glass, and aluminum. Special care should be taken when enclosing existing outdoor pools because the existing slope of the deck away from the pool may cause problems with corrosion or standing water if adequate drainage and dehumidification is not provided. The minimum pool ceiling height above the water surface for natatoriums is 6 meters (19 feet, 9 inches) for facilities with 1-meter diving boards. A minimum ceiling height of 8 meters (26 feet, 4 inches) is required for facilities with 3-meter diving boards. Natatoriums should not have deck-level windows in walls facing pool ends to prevent glare. Deck level windows at the side should be tinted.



Natatorium Design for Ramstein AB



Natatorium Design for Ramstein AB

3-5.1.1 **Vestibules and Airlocks**

Consider the need for vestibules and airlocks in natatoriums based upon the climatic issues at each installation when designing entry vestibules and provide double sets of entrance doors to create an airlock. Provide wheelchair accessible ramps and

automatic doors according to the accessibility requirements identified in [Section 2-5, Accessibility](#). Walk-off mats inside the airlock and removable rugs in lobby areas should be provided. Consider built-in drains inside recessed walk-off mats in foyers to allow water to drain off, and heated mats in cold weather climates. Provide adequate ventilation or climate control to prevent moisture accumulation or condensation. Provide signage at the front entrance that displays the aquatic facility's hours of operation and FPCON status. Provide a trash container, ash receptacle, and bicycle rack outside of the building, near the customer entrance.

3-5.2 Building Organization and Circulation

Bathhouse and natatorium space organization should take advantage of local climate conditions, such as prevailing winds and sunlight. Consider the desired flow of customer traffic from the entry control point to the pool deck and the need to provide convenient access to the shower areas that will help encourage customers to shower before entering the pool. Provide convenient customer access to the showers, restrooms, and changing areas from the pool deck. Lockers may be located inside the changing room area or outside on the pool deck. Lockers located on the pool deck reduce problems associated with theft and vandalism because they are more visible to customers and staff. Lockers or clothing storage may need to be located within the administrative areas if a basket check-in system is used, however this system is discouraged because it requires additional staffing and the liability of responsibility for customer possessions. Consider locating the administrative and entry control checkpoint in the center of the building with changing facilities on each side to provide separation between male and female facilities.

3-5.3 Clothing Storage

The means of clothing storage directly affects the internal organization of the bathhouse. One of the following methods shall be chosen:

- Lockers with coin operated, electronic, or user provided locks within the dressing room area or located on the pool deck.
- Basket storage in the control area operated by an attendant.
- Basket storage located in the dressing room operated by customers with coin operated, electronic, or user provided locks.

3-5.3.1 Locker Systems

Coin operated lockers located in dressing rooms shall be corrosion resistant, easily cleaned, and not conducive to rust or water accumulation. If space will allow, the optimal arrangement is two tiers that permit the hanging of adult street clothes. Tiers of five or six lockers shall be used where less area is available. The best locker arrangement is back-to-back in bays or alcoves off two main circulation aisles. Each bay shall have a 410 mm (16 inch) high bench in the middle for the entire length. The bench shall be a minimum of 810 mm (2 feet, 8 inches) away from the locker doors and situated to allow turning space for the handicapped. When a bay is more than 16 lockers long, the bench shall have a 910 mm (3 feet) long break every 4.6 meters (15 feet). Lockers shall be installed on a concrete pad with a recessed or coved base.



Lockers with User Provided Locks



Basket Storage System

3-5.3.2 **Basket Systems**

Baskets shall be wire mesh or perforated, corrosion resistant, easily cleaned, and not conducive to rust or water accumulation. They shall be stored on racks that will accommodate five to six baskets vertically. Both baskets and racks shall be designed to accommodate padlocks when racks are placed in the dressing area. Padlocks are not required when the baskets are stored in the check-in area or on the pool deck. The best arrangement is back-to-back in bays as with lockers. Racks shall be installed on a concrete pad with a recessed or coved base.

3-5.3.3 **Table: Locker and Basket Storage Systems Comparison**

	Convenience	Security and Staffing
Lockers Coin-Operated at Dressing Rooms	<input type="checkbox"/> Most secure <input type="checkbox"/> Most convenient <input type="checkbox"/> Lockers 762 mm (30 inches) or higher allow clothes to be hung	<input type="checkbox"/> Highly secure <input type="checkbox"/> Minimum surveillance required <input type="checkbox"/> No staff operation required
Baskets at Control Desk	<input type="checkbox"/> Awkward for storage of adult street clothes <input type="checkbox"/> All clothing must be folded	<input type="checkbox"/> Highly secure <input type="checkbox"/> Required greater staff time <input type="checkbox"/> Security is the responsibility of management
Baskets at Dressing Rooms with User Provided Padlocks	<input type="checkbox"/> Awkward for storage of adult street clothes <input type="checkbox"/> Users must remember to bring own locks <input type="checkbox"/> Most convenient system if user needs repeat access to basket during visit	<input type="checkbox"/> Minimal security <input type="checkbox"/> No staff operation is required, but surveillance is desirable

3-5.4 **Pool Equipment Storage**

There is an extensive amount of equipment required for the operation and safety of the pool and other components of the facility. Storage areas must be carefully sized and designed not only to accommodate all the required equipment, but to allow instant access to those items related to life saving procedures.

3-5.5 Surveillance and Security

Bathhouse or natatorium layout and overall site organization shall allow effective monitoring of the facility at all times with a limited staff. A prominent check-in/check-out counter shall be located near the main entrance. It shall be manned by one person and shall have unobstructed views of all entrances and exits. The pool office shall have complete and unobstructed surveillance of the entire deck and pool area. Lifeguard stations have specific surveillance requirements depending upon the configuration of the pool and other facilities. Refer to [Section 4-4.1, Lifeguard Stations](#) for detailed information regarding location and quantity requirements. Consider the need for closed circuit television (CCTV) cameras to facilitate surveillance of the entire facility. If needed, provide CCTV components and infrastructure including cameras, monitors, conduit, cabling, power, and junction boxes, as required, for a complete and operational system. Place a CCTV monitor in the staff office or check-in counter where it can be easily viewed by the facility director and staff.

3-5.6 Architectural Character

Bathhouse and building designs shall express the recreational role the aquatic facility plays in the life of the community and should project a feeling of informality. Although there is no single mandatory style, the design shall respect the style, scale, and character of the surrounding area. Careful consideration should be given to coordinating material selections, course lines, roof slopes, scale of windows, and other building elements to ensure the building style complies with the base specific architectural compatibility guidelines and better buildings in the local area. Bathhouses that are removed from surrounding structures offer the opportunity for a more unique architectural form, but should still be compatible with the overall styling and character of the base, as well as the geographic region. Locate unsightly elements, such as pool equipment and garbage dumpsters, at the back of the facility where they are not visible from roads and parking areas. Screen these items and similar elements, when needed, with landscaping, walls, fencing, and other architecturally compatible materials.

The architectural and interior design of aquatic facilities must be integral and related. Both involve functional analysis and consideration of the appropriate environmental character, building organization, circulation, supervision, and flexibility requirements, as well as finishes and furnishings. Present an open, inviting image while providing visibility of attractive activities from the approach and entrance. Controlled, indirect daylight should be admitted into dressing rooms and administrative areas through clerestories, skylights, or windows. Use of daylight will reduce the load on electric lights and permit visual connection to the outside. Consider sunlight filtering devices applied to windows and solar shade screens to reduce UV exposure and thermal heat gain.

3-5.6.1 **Figure: Architectural Character**



Architectural Character Must Conform to Base Standards



Architectural Character Must Conform to Base Standards

3-6 **INTERIOR DESIGN**

Interior surfaces, details, finishes, fixtures, and fittings should be carefully selected for resistance to wear, impact, and vandalism. Because of the high humidity associated with pools and showers, all materials selected shall be resistant to water and mildew. Utilize professional interior designers with experience in aquatic facility design. Surface materials and furnishings should be selected through the use of structural interior and comprehensive interior design services. Include a request for such services in the Requirements Document. Interior design selections shall be based on consideration of anticipated use, maintenance characteristics, life cycle cost, fire protection, and other safety requirements. Refer to the [Air Force Interior Design Guides](#), MAJCOM specific interior design guidelines, and base specific architectural compatibility guidelines or facilities excellence standards for additional information.

3-6.1 **Interior Finishes**

The safety and hygiene of customers shall be considered in every aspect of the design development. Floor and deck surfaces in wet areas must be slip resistant. Wall surfaces should be selected to minimize abrasions in case of accidents or stumbles by customers and staff. Coordinate material, finish, color, texture, and furniture selections to compliment the overall building design and image. Use colors, textures, and finish materials on the walls and floors to help define circulation patterns. Select surface materials and furnishings to express a warm, intimate, and relaxed atmosphere. Use local materials to the greatest extent practicable to reinforce the user's sense of place or region.

3-6.2 **Flooring**

Utilize non-skid ceramic tile, concrete, or other skid resistant material for bathhouse or natatorium floors and in other administration areas. Ensure that flooring materials, such as rubber, comply with applicable AF and MAJCOM criteria. All floors should have adequate slope and drains to prevent standing water.

3-6.3 **Interior Walls**

Walls should be constructed with nonabrasive materials, like smooth block or brick. Walls may be painted CMU block, painted masonry, moisture resistant gypsum board,

Portland cement plaster, or high strength gypsum plaster. Ceramic tile may be installed either full height or as a wainscot.

3-6.4 Ceilings

Ceilings should utilize moisture resistant materials, like sealed wood, moisture resistant gypsum board, plaster, galvanized metal, or other factory finishes impervious to water and mildew. Ceiling height shall be at least 2.75 meters (9 feet).

3-6.5 Furniture, Fixtures, and Equipment

Choose interior furniture, fixtures, and equipment (FF&E) that is durable, comfortable, and attractive. Consider modular or systems furniture components that match for the office, staff break area, and training room. Check-in and concession counter fronts are high maintenance and require highly durable materials because of the wear and tear. Consider metal, solid surface composite materials, or stone for the front counter panels and counter tops. Provide corrosion resistant and graffiti resistant furniture and materials in dressing rooms.

3-6.6 Interior Signage

Interior signage is important to support the functionality of the facility and for wayfinding. Use signs with words and graphic symbols, where appropriate. Interior signage shall comply with the accessibility requirements identified in [Section 2-5, Accessibility](#) for the visually impaired. Interior signage should be horizontal only and in upper and lower case text, except where specifically required to be in all capital letters according to [ADA](#) requirements. An interior signage system should be developed in accordance with [UFC 3-120-01, Air Force Sign Standard](#). Provide interior AFSVA identification and branding signs as required by the current *Services Signage Enhancement Program*.

3-7 FACILITY SYSTEMS

Facility systems include specific guidelines for core building systems, such as structural, mechanical, electrical, plumbing, lighting, fire protection, life safety, security, and acoustics.

3-7.1 Structural

Select an economical structural system based on facility size, projected load requirements, local availability of materials and labor, and wind, snow, seismic, geologic, and permafrost conditions. Select and design the structural system based on analysis of projected future needs to accommodate future expansion requirements easily and economically. However, do not over-design the initial construction. Structural bay sizes should reflect space requirements, economy, and subsystem dimensions, such as masonry units and ceiling grids. Structural bay sizes should be compatible with standard shelving and locker unit sizes and standard row-to-row dimensions. Keep the floors under two stories in height, where possible, or the costs associated with designing in progressive collapse criteria will need to be incorporated. The exact soil conditions, sub-soil conditions, and water table depth should be verified during the geotechnical investigation at the beginning of the design process. For detailed structural design requirements, refer to [UFC 1-200-01 Design: General Building Requirements](#), [UFC 3-310-01 Design: Structural Load Data](#), [International Building Codes](#) and other related UFC located on DoD websites.

3-7.2 Heating, Ventilation, and Air Conditioning (HVAC)

Mechanical systems for any administrative space and natatoriums must be capable of maintaining an indoor air temperature of 22°-24°C (72°-75°F), water temperature of 26°C (78°-80°F), relative humidity of 50-60, and ventilation of at least 4 complete air changes per hour during high occupancy. Deterioration of materials from condensation should be anticipated and minimized with proper mechanical design and wall transmission values. Air velocity in the immediate pool area should be minimal. Provide heating, ventilating, and air conditioning (HVAC) systems in compliance with [UFC 3-410-01FA](#), *Design: Heating, Ventilating, and Air Conditioning* and [UFC 3-410-02A](#), *Design: Heating, Ventilating, and Air Conditioning (HVAC) Control Systems*. Also comply with the recommendations of the [American Society of Heating, Refrigeration, and Air Conditioning Engineers](#) (ASHRAE), where applicable. Detailed procedures for HVAC control and design are also found in [AFH 32-1084](#), *Facility Requirements*.

Provide a night setback for the HVAC system and zone control for maintaining different environmental conditions in each required functional area. Provide tamper proof digital thermostats that are programmable and located where they may be internally controlled by the aquatic facility manager. Utilize security features so that thermostats are only accessible to authorized personnel. Design of new facilities shall ensure that building energy consumption shall not exceed the [DoD](#) energy budget figures. Perform a life cycle cost analysis of available energy sources and design the HVAC system to comply with the requirements of the most current edition of the International Mechanical Code (IMC). Utilize MIL-HDBK 1003/3, *Heating, Ventilating, Air Conditioning, and Dehumidifying Systems* as supplemental guidance until it is replaced.

Comply with AT/FP requirements in the design of HVAC systems. Incorporate energy efficiency as a primary design consideration, including consideration of passive solar design applications. Consider optimum sized active solar space heating and domestic hot water heating systems if the MAJCOM's solar assessment shows a benefit/cost ratio of greater than one. Provide for hook-ups to base energy management and control system (EMCS), if applicable. Consider climate conditions, high humidity, industrial atmosphere, salt water exposure, or other adverse conditions when selecting exterior HVAC components to ensure durability. Refer to [AFCEA Engineering Technical Letters](#) for additional information. Design building HVAC systems to accommodate long term flexibility, renovations, and additions.

3-7.2.1 Bathhouse Ventilation

Bathhouses for outdoor pools are neither heated nor air conditioned except for administrative areas; however because of the high humidity produced in the shower and dressing areas, as well as the potential odor associated with locker storage, the bathhouse should be thoroughly ventilated. Designs should provide a minimum of six air changes per hour. Provide mechanical ventilation fans in dressing rooms, showers, and toilets to help reduce excessive humidity and odor.

3-7.3 Plumbing

Water for showers shall be heated to at least 32°C (90°F). Provide automatic mixing valves on showers where hot water is over 40°C (105°F). Shut off valves shall be provided at all plumbing fixtures. Floor drains shall be provided in all dressing rooms,

shower rooms, toilet areas, and janitor's closets. Provide domestic hot and cold water, sanitary and storm drainage, plus propane or natural gas systems (if required), in accordance with design requirements established in [UFC 3-420-01](#), *Plumbing* and [AFH 32-1084](#), *Facility Requirements*, *International Building Code* (IBC), local requirements, and additional technical information provided on the [AFCESA](#) website. Provide metering for gas service, if utilized. Hot and cold water shall be supplied to all restrooms, sinks, and janitor's closets. Hot water temperature shall not exceed 40°C (105°F) at the outlet. Provide frost-free hose bibs on exterior walls to enable hose access to the entire pool deck and locate interior hose bibs to enable hosing down of all wet areas within the bathhouse. Consider providing water metering where water conservation measures are in effect.

3-7.4 Electrical

All electrical outlets shall feature GFCI protection. Provide electrical service, distribution equipment, wiring receptacles, grounding, interior and exterior lighting, controls, emergency lighting, telephones, communication systems, fire alarms, and intrusion systems in accordance with [UFC 3-520-01](#), *Interior Electrical Systems*, [NFPA 70](#), *National Electrical Code*, and the latest installation design requirements. See the latest edition of *Electric Current Abroad* provided by the U.S. Department of Commerce, to determine voltages and cycles for overseas locations. Service grounding system and all wiring methods must meet the current National Electric Code (NEC) requirements and NFPA 70 requirements. Provide ground fault protection of all motors, lighting fixtures, and power receptacles at suitable levels. All electrical equipment must be [Underwriters Laboratories](#) (UL) listed or published proof of safety and performance from an approved independent testing laboratory shall be provided. Provide a sufficient number of floor and wall electrical outlets to accommodate current needs and potential future growth. Base service ampere capacity upon the following minimum criteria for the building:

- Interior Lighting - 2.5 watts per square foot
- Receptacles - 1.0 watts per square foot
- Exterior Area Lighting - 10 watts per square foot

Provide an intrusion detection alarm system and an electric wall clock visible from the pool deck area. Secondary underground service raceways may be PVC Schedule 40. General convenience receptacles and special power outlets shall be specification grade. Provide metering for electrical power. Refer to the publications provided on the [AFCESA](#) website for additional technical electrical information.

3-7.5 Fire Protection and Life Safety

Fire protection and life safety designs must comply with the following sources for detailed guidelines and specifications:

- [UFC 3-600-01](#), *Design: Fire Protection Engineering for Facilities*
- [UFC 3-600-02](#), *Operations and Maintenance Inspection, Testing, and Maintenance of Fire Protection Systems*

- [MIL HNBK 1008C](#), *Fire Protection for Facilities, Engineering, Design and Construction*
- Latest edition of the [National Fire Protection Association](#) (NFPA) standards

All new and refurbished buildings shall have automatic fire detection and fire suppression systems, which shall be monitored to send signals to the base fire station, central control, or monitoring facilities. All materials and equipment shall be UL listed or Base Fire Marshall approved. The provisioning of fire protection systems and equipment shall be reviewed for all new and refurbished buildings as part of a “Fire Risk Analysis” and “Fire Strategy” study, executed during the design period. During the design period, careful consideration shall be given to the selection of specific design codes, standards, base specific criteria, and Base Fire Marshall requirements that shall affect the equipment specifications, design, and installation. Equipment selections should not be considered in isolation, but shall be reviewed in unison with the overall fire strategy for each building and installation.

3-7.6 Communications and Data

Two-way communication stations shall be provided at the check-in area and the office. At least one telephone and data outlet with high-speed Internet connections shall be provided in the check-in and office area. Public pay phones should be located in or near the facility. Consult with the Communications Squadron at each installation for base specific requirements and guidelines. Due to the technical nature and rapidly changing communications and data requirements, refer to the following sources for detailed guidelines and specifications:

- [ETL 2-12](#), *Communications and Information System Criteria for Air Force Facilities*
- [AFI 33-104](#), *Base-Level Planning and Implementation*
- [USAFE Information Technology Architecture](#) (Latest Edition) for USAFE installations

Provide junction boxes with rigid conduit within the ceilings and walls that includes the required infrastructure for telephone and data connections. Telephone and data outlets may be independent of each other or combined into a single junction box. If these connections can be combined into a single junction box, the cover plate to that junction box must allow for multiple connections. Confirm the preference for individual or combined telephone and data outlets with installation specific contacts.

3-7.7 Public Address System

A centrally controlled public address and two-way communication system is required for all pool facilities. Incorporate a public address (PA) capability with the phone system to allow paging from all staff phones, where possible. Provide a PA system at the circulation desk if it cannot be incorporated in the phone system. At least one public address speaker shall be provided in each dressing room, office, check-in, public toilet, and lobby (at indoor pools). One indoor speaker shall be provided for every 74.3 sq.

meters (800 sq. feet) of net floor area. A minimum of two outdoor speakers shall be provided for every 25-meter pool and at least three speakers for every 50-meter pool. Refer to [UFC 4-021-01](#), *Design and O&M: Mass Notification Systems* for additional information.

3-7.8 Interior Lighting

All artificial lighting fixtures in a given space shall be capable of independent switching and shall be located to allow for re-lamping from floor or catwalk surfaces with the aid of portable ladders or scaffolding, if necessary. Light fixture requirements, recommended types, and minimum levels of illumination at 910 mm (3 feet) above the finished floor are listed in [Table 3-7.8.1](#), *Artificial Lighting Criteria*. Because the bathhouse is not heated or air conditioned and occupancy by bathers is very short term, there are many opportunities for natural day lighting. Skylights or open air configurations may be appropriate for the entry control, food service, and some administrative areas. Beyond the obvious constraints of modesty, which requires visual screening up to 2.4 meters (8 feet), glass or open air penetrations are possible in all areas of the dressing rooms, toilets, showers, etc. The opportunity for energy savings, natural ventilation, and day lighting offer a design freedom that exists in few other building types. Where a solar assessment shows an active solar application to be cost effective, it shall be included to supplement pool water or space heating requirements.

Fluorescent fixtures with low temperature, energy efficient ballasts and lamps are appropriate for most areas unless other lighting requirements are identified. Provide wet area rated fixtures in designed wet areas like the showers, dressing areas, and toilets. Utilize daylight lamps for most applications, because cool white lamps are too cold. Consider light fixtures that minimize glare and shadowing. Where natural light is available, provide lighting control systems, including ambient light dimmers to automatically reduce the intensity levels of artificial lighting. Interior lighting for new construction shall meet the current codes and the applicable recommendations of the [Illuminating Engineering Society of North America](#) (IESNA). Renovation of existing interior lighting shall meet the current recommendations of the IESNA to the extent possible. Additional guidance for lighting renovation in federal buildings may be found on the [Federal Energy Management Program](#) (FEMP) website.

3-7.8.1 Table: Artificial Lighting Criteria

	Light Fixture Requirements	Illumination Level	Recommended Lamp Type
Dressing Rooms	<input type="checkbox"/> Moisture resistant housing <input type="checkbox"/> Impact resistant lens or protective housing	10 foot candles	Warm white fluorescent
Shower and Toilet Areas	<input type="checkbox"/> Moisture resistant housing <input type="checkbox"/> Impact resistant lens or protective housing	20 foot candles	Warm white fluorescent or standard incandescent
Public Toilets	<input type="checkbox"/> Moisture resistant housing <input type="checkbox"/> Impact resistant lens or protective housing	20 foot candles	Warm white fluorescent
Check-in Area	<input type="checkbox"/> Switched by dimmers to vary illumination levels	30 foot candles	Warm white fluorescent or standard incandescent
Office	<input type="checkbox"/> Switched by dimmers to vary illumination levels	50 foot candles	Warm white fluorescent or standard incandescent
Clothing Storage Area	<input type="checkbox"/> Dependent upon location	30 foot candles	Warm white fluorescent or standard incandescent
Storage Areas	<input type="checkbox"/> Impact resistant lens or protective housing	30 foot candles	Warm white fluorescent or standard incandescent
Lobbies (Natatoriums Only)	<input type="checkbox"/> Switched by dimmers to vary illumination levels	15 foot candles	Warm white fluorescent or standard incandescent
Concessions Area	<input type="checkbox"/> Indoors - Switched by dimmers to vary illumination levels <input type="checkbox"/> Outdoors - Moisture resistant housing with impact resistant lens or protective housing	15 foot candles	Warm white fluorescent or standard incandescent
Mechanical Rooms	<input type="checkbox"/> Impact resistant lens or protective housing	15 foot candles	Warm white fluorescent
Filter Rooms	<input type="checkbox"/> Moisture resistant housing <input type="checkbox"/> Impact resistant lens or protective housing	50 foot candles	Warm white fluorescent

3-7.9 Alarm Systems

Provide an alarm system for intrusion detection to protect equipment and assets. Coordinate at the base level to provide alarm system equipment that is compatible with the systems utilized at each base. Provisions for an alarm system must be justified during the planning and programming process.

CHAPTER 4

FUNCTIONAL AREA GUIDELINES

4-1 **GENERAL**

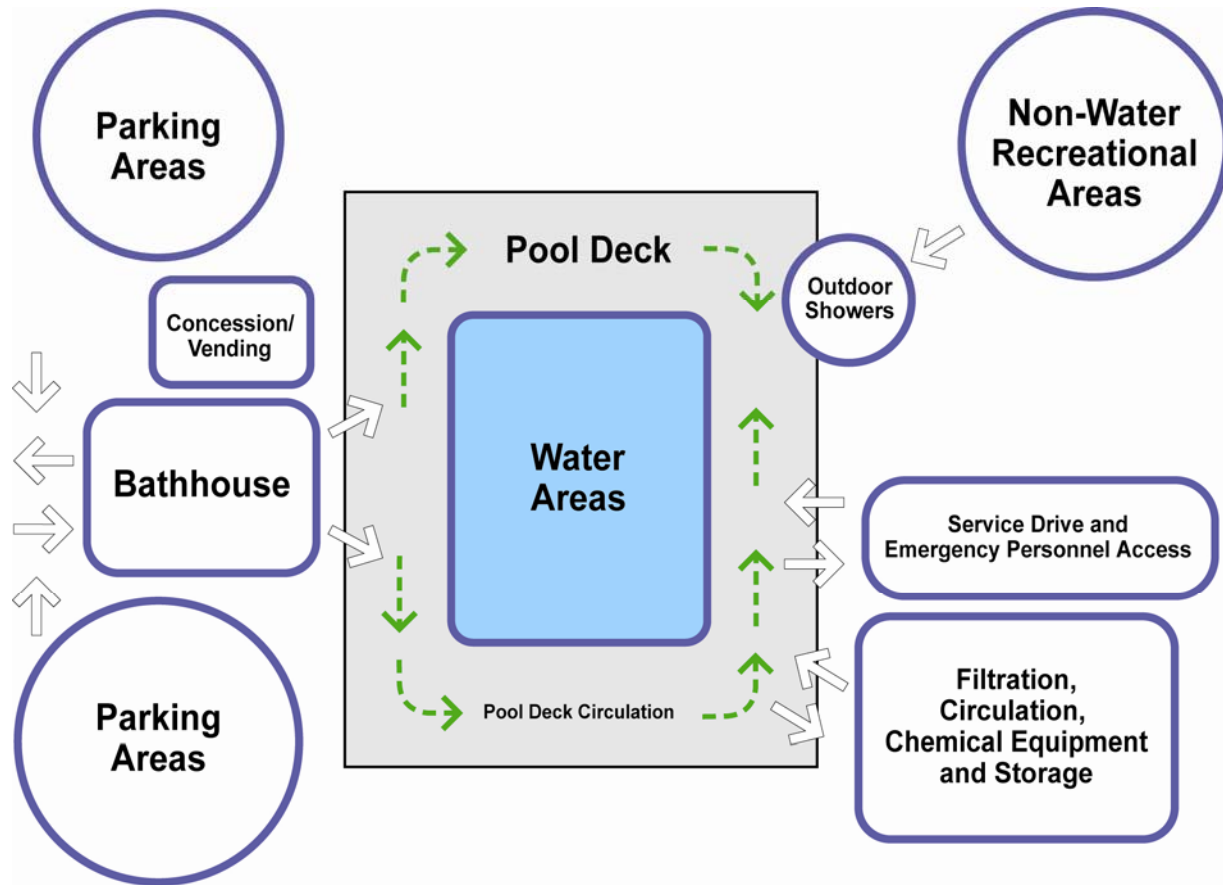
Chapter 4 presents criteria specifically applicable to the design of each functional area and space of aquatic facilities. Primary design considerations are presented for each functional area indicating the anticipated use, performance, organization, character, and relationships between each area's component spaces. Specific criteria is provided concerning space sizes, critical dimensions, storage requirements, furnishings, equipment, and technical requirements for each component space within each functional area. The technical requirements provided in this chapter address only items with special criteria for each individual space. General considerations are presented in [Chapter 3](#).

The guidelines in this chapter apply to all sizes and types of aquatic facilities. Specific space allocation guidance for the three prototypical sizes of general aquatic facilities is presented in [Chapter 2](#). All guidance is provided based on the recommended space sizes and capacities for each overall facility size, supplemented by standard use and size factors, as appropriate. These recommendations may be modified in the design of an individual project to reflect local program requirements and capacity needs.

4-2 **SITE FUNCTIONAL AREA GUIDELINES**

Because there are so few functional spaces and the use of the facility is so singularly directed, the relationship of spaces is quite simple. The major component spaces to be considered during site design for outdoor pools include the bathhouse, parking areas, pool, pool deck, circulation and filtration equipment, chemical storage, service drive, and non-water recreation areas.

4-2.1 **Figure: Site Functional Area Relationships**



4-2.2 **Non-Water Recreational Areas**

Depending upon the design of the site and local conditions, outdoor recreation areas may be desired in grass areas surrounding the pool deck. Consider the need for non-water related recreational areas located inside the pool compound, such as sand volleyball courts and grass areas that may be utilized for sunbathing, throwing Frisbees, horseshoes, picnics, and similar activities. Provide ample shaded areas and shelters for protection from the sun. Consider the need for picnic tables, outdoor grills, and similar site furnishings for birthday parties and other group functions that are compatible with the base Facility Excellence Standards. Physically separate non-water recreation areas from the main pool with a low fence, wall, or barriers with a closing gate to prevent children from wandering into the pool deck.



Non-Water Recreation Areas



Non-Water Recreation Areas

4-2.3 Outdoor Showers

Provide outdoor showers at the entrance to the pool deck, where needed, to allow swimmers to rinse off dirt, sand, and sweat prior to entering the pool. Exterior showers will encourage swimmer cleanliness by providing convenient access to showers on the pool deck without the need to re-enter the dressing room area. Locate appropriate drains to prevent water from outdoor showers from accumulating on the pool deck.

4-2.4 Parking Areas

Parking areas should not dominate the building entrance and should be located to the sides of the building, where possible. Provide adequate artificial light levels at night in all parking areas for security and safety. Consider the need for a dedicated staff parking section that is located near the staff only entrance to the building or bathhouse. Dedicated spaces for motorcycles and bicycle racks should also be provided as required by the base population. Consider the location of bicycle racks near the main entrance in a secure location.

4-2.5 Fences, Gates, and Wind Screens

The pool and surrounding deck area shall be completely enclosed with a minimum barrier height of 1.2 meters (4 feet). The purpose of a fence of this height is to prevent children from wandering into the pool area and is not designed to prevent unauthorized access when the pool is closed. For pools where unauthorized access may be an issue, the minimum fence height shall be 2.4 meters (8 feet). All gates or doors required must be lockable. Segregation of areas within the deck (spray ground, wading pool, food service areas, spectator seating, etc.) should be accomplished with 760 mm to 910 mm (2 feet, 6 inches to 3 feet) high fencing. Do not use chain link fencing because it is associated with industrial applications. Utilize fencing that is architecturally compatible with the fencing in nearby areas that is visually permeable so that Security Forces may easily monitor activities within the compound. Brick or masonry walls may also be used to screen equipment and provide some protection from wind. The fence materials should match or compliment the exterior bathhouse and building materials, where possible. Consider the need for combination fencing in some areas that have brick or masonry bases with fencing material mounted on top. This type of fencing may help prevent grass clippings and other debris from entering the pool compound.

Emergency access gates must be a minimum of 1.83 meters (6 feet) wide to accommodate emergency personnel and rescue equipment.



Ornamental Fencing



Combination Fencing

4-2.6 **Filtration, Circulation, and Heating Systems**

Separate all pool mechanical equipment and chemical storage areas away from public access. Pool mechanical systems may be located inside the bathhouse structure or outside within a fenced or enclosed exterior compound depending upon the type of equipment utilized. Equipment includes pumps, pipes, filter tanks, water heaters, chlorine and disinfectant feeders, surge tanks (if needed), and control panels. Locate all equipment with convenient access for maintenance. Provide sufficient space for the placement, replacement, and servicing of each piece of equipment. Typical area requirements are 27.8 to 37.2 sq. meters (300 to 400 sq. feet) for a 25-meter pool and 37.2 to 55.7 sq. meters (400 to 600 sq. feet) for a 50-meter pool. Doors or openings shall be sized to permit the replacement of all equipment and ventilation is required for motors and heaters. Consider locating equipment outside near the service drive, if possible, because it is usually more cost effective and easier to provide adequate working space around each component.



Filtration and Circulation Equipment Room



Filtration and Circulation Equipment Room

4-2.7 **Chemical Storage**

Provide a separate chemical storage room or structure for chlorine and other chemicals. Locate this storage area within the mechanical equipment compound or in a room adjacent to the pool equipment that is not accessible to the public. Typical floor area needed for chemical storage is 2.79 to 4.65 sq. meters (30 to 50 sq. feet) for a 25-meter pool and 4.65 to 6.5 sq. meters (50 to 70 sq. feet) for a 50-meter pool. Doors shall be secure from break-ins and warning signs shall be posted concerning gaseous chlorine storage and the need for protective clothing and equipment. The chemical storage room shall be fire and explosion proof and shall have a vent fan capable of one complete air change in one to four minutes. An [OSHA](#) approved eye wash station, gloves, protective goggles, and gas masks are required in the pool equipment and chemical storage areas.

4-2.8 Service Drives and Emergency Vehicle Access

The size of required emergency and service vehicles should be verified by the A/E prior to planning the service access areas. A back-up spur should be provided for dead-end and service drives that exceed 30 meters (100 feet) in length. Service drive access should be provided to the circulation/filtration equipment and chemical storage area. Screen or separate the service area from public use or traffic areas with attractive fences, walls, depressions, berms, or landscaping. Ensure proper drainage if depressions are used. Provide direct access to the pool deck from the service drive for emergencies and do not cross outdoor activity areas with service access. Ensure compliance with AT/FP standards, particularly for dumpster separation and access control. Asphalt or concrete access drives to the loading dock must be a minimum of 3.6 meters (12 feet) wide for access by trucks and emergency vehicles. Provide easy access to dumpsters or outside trash containers located on paved areas or a concrete pad.

4-3 WATER AREA GUIDELINES

General use pools may be used for a wide range of activities, including lane swimming, instructional programs, competitive swimming, and general recreational swimming. Water areas include the main pool swimming and diving areas, wading pool, and spray ground areas. Visual monitoring of the water areas from the staff office is required at all times. Access to the pool from the bathhouse or dressing room areas should be near the shallow end.



Water Areas



Water Areas

4-3.1 **Lap and Competitive Swimming Areas**

General use pool configurations provide the most versatile pool facilities for lap and competitive swimming. Provide a minimum 25-meter long area for lap swimming where lanes can be roped off. Detailed specifications for competitive swimming facility requirements will depend upon the regulatory agency sponsoring certain events. Consult [AAU](#), [NCAA](#), [NFHS](#), [USS](#) or [FINA](#) regulations for detailed specifications and additional information since these requirements are subject to annual review and change.

4-3.2 **Lane and Area Dividers**

Lane and area dividers consist of a set of continuous floats strung on a cable or cord. They are attached at hoops anchored in the pool walls. Pool dividers must incorporate some method of tensioning so that they can be stretched tight and held in position. One racing lane float divider shall be provided to separate each racing course lane in the general use pool and to separate deep water (the diving area) from shallow water. Cup anchors or lifeline hooks shall be centered between racing lanes and at the line separating diving from free swim areas. Provide a floating line or lane marker to mark the 1.5 meter (5 foot) depth point during recreational swim periods unless it interferes with lap swimming.



Floating Lane and Area Dividers



Provide for Adequate Storage of Lane and Area Dividers

4-3.3 **Racing Lanes and Target Markings**

Provide racing lane and target markings according to the appropriate governing entity that may be involved in competitive events ([NCAA](#), [FINA](#), etc.). Consider the need for a recall line (for backstroke events) suspended above the racing course at least 1.22 meters (4 feet) above the water surface. For a 25-meter course, it shall be located 12 meters (40 feet) from the starting end. For a 50-meter course, it shall be located 15 meters (50 feet) from the starting end. Consider the need for finish contact pads. If utilized, contact pads shall be a minimum of 1.98 meters (6 feet, 6 inches) wide by 610 mm (2 feet) in depth. They shall be installed in a fixed position in the center of the lane and flush with the water level.

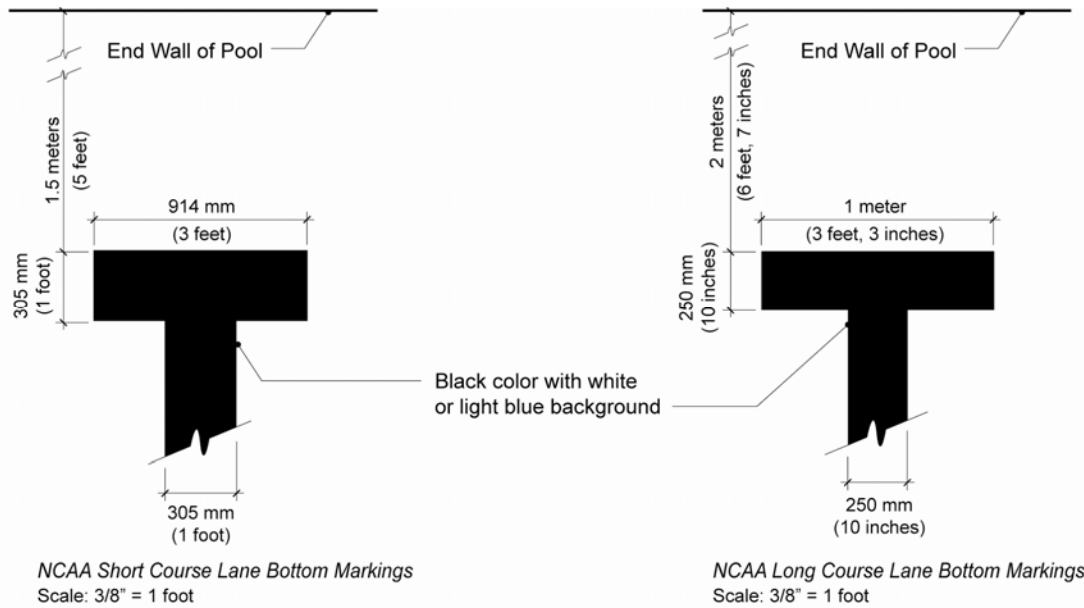


Lane Markings

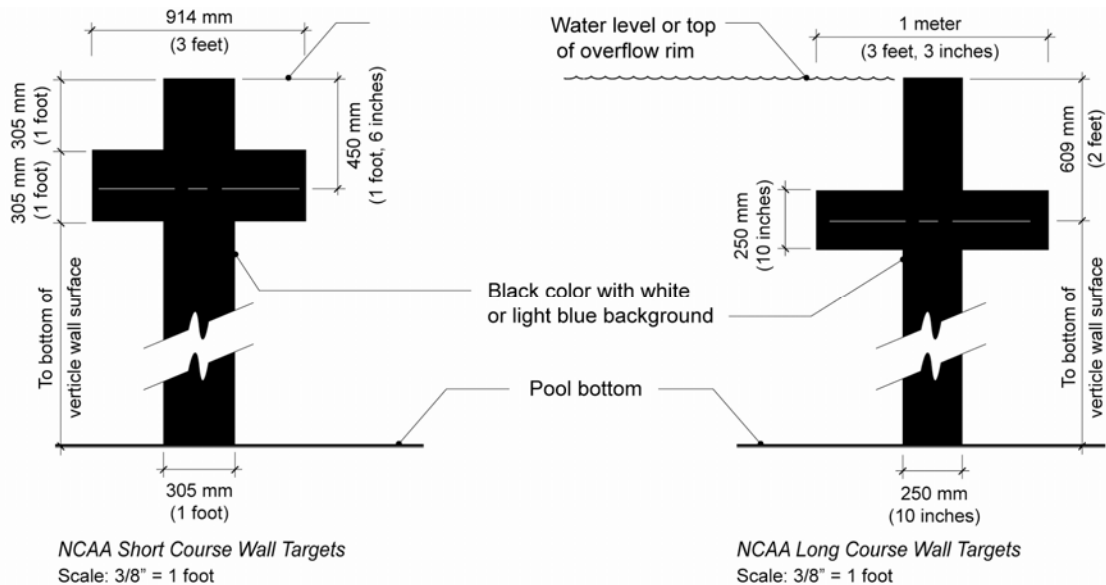


Lane Markings

4-3.3.1 Figure: Racing Lane Bottom Markings



4-3.3.2 Figure: Racing Lane Wall Targets



4-3.4 Diving and Deep Water Areas

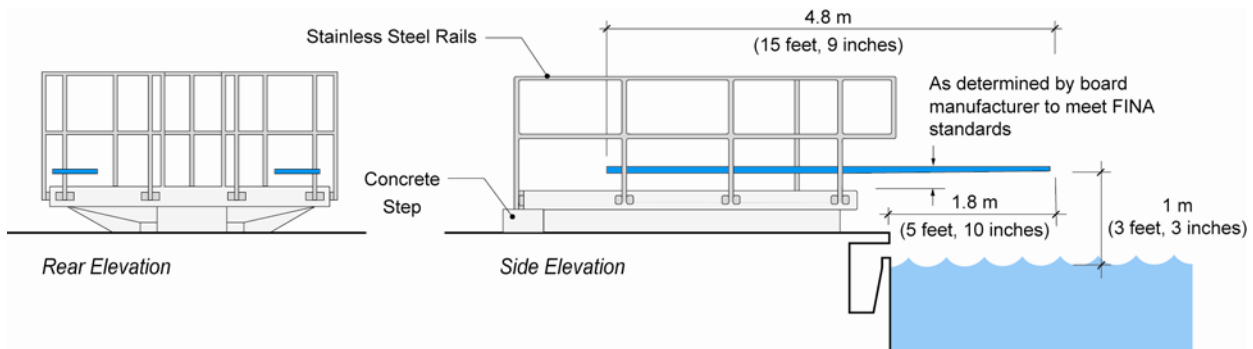
These areas are used for competitive diving, recreational diving, scuba training, survival training, and other activities requiring deep water. Diving and deep water areas may be accommodated in three possible ways:

- The preferred method is to locate diving areas adjacent to the deep end of a general use pool as demonstrated in the typical "L" shaped configuration.
- Incorporate the diving area into the deep end of a general use pool.
- Provide a separate pool exclusively for diving or deep water training and programs.

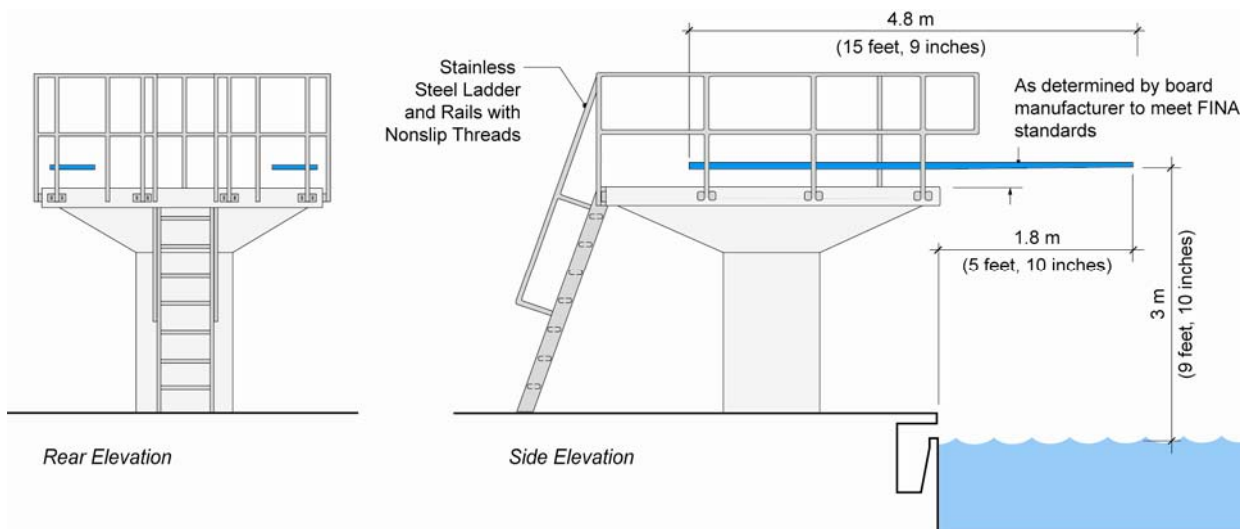
4-3.5 Diving Boards and Stands

Provide springboards, as desired, that are manufactured from aluminum, fiberglass, or wood coated with a non-skid surface. For springboards of 3 meters (10 feet) or more, an open-grating type of construction is required to permit divers to view the water below. Springboard dimensions are 4.9 meters (16 feet) long and 500 mm (1 foot, 8 inches) wide. The installation should be level. The number of springboards depends on the size of the diving area to be included. Springboard anchors should be embedded in the pool deck or other surface of sufficient mass. The fulcrum should be adjustable through a range of 610 mm (2 feet) forward from a point 1.7 meters (5 feet, 6 inches) from the rear anchor of the board. The fulcrum mechanism should be covered to prevent injury to fingers or toes. Diving boards over 610 mm (2 feet) in height must have 910 mm (3 feet) high handrails extending to the water's edge. Provide a water surface agitator to increase diver visibility utilizing water jets from the overflow system or air bubble inlets in the pool bottom. The same life safety equipment and lifeguard stations are required for diving areas as needed for the general use pool water areas.

4-3.5.1 Figure: 1-Meter Diving Boards



4-3.5.2 Figure: 3-Meter Diving Boards



4-3.5.3 Special Diving Requirements

The minimum number of springboards required for competition is one 1-meter board and one 3-meter board. Detailed specifications for competitive diving will depend upon the regulatory agency sponsoring certain events. Consult, [AAU](#), [NCAA](#), Interscholastic, or [FINA](#) regulations for detailed specifications. High diving platforms are typically 7.4 meters (24.3 feet) and 10 meters (32.8 feet) high and require a structural steel, precast concrete, or laminated wood structure. Platforms shall be of an open glazing or concrete construction. Protective measures of non-slip surfaces and handrails shall be taken. An elevator or man lift is recommended for easy access. Outdoor diving boards should face north or east.

4-3.6 Water Slides

Consider the need for recreational water slides in the water areas. Only feet first sliding is permitted. For slides that end less than 1 meter (3.28 feet) above the water and where swimmers experience moderate speeds or angles of entry (less than 10 degrees), the minimum water depth is 1.5 meters (5 feet) for at least 4.5 meters (15 feet) out from the end of the slide. For slides that end higher than 1 meter (3.28 feet) above the water and where swimmers experience moderate speeds or angles of entry

(more than 10 degrees), the minimum water depth is 2.5 meters (8 feet) for at least 4.5 meters (15 feet) out from the end of the slide.



Water Slide



Water Slide

4-3.7 **Play Structures and Equipment**

A wide variety of commercially manufactured play structures designed for use in aquatic environments are available from different specialty companies. Include play structures as part of the spray ground areas to create a water park environment. Consider the need for play structures located inside the main pool and other water areas similar to private sector water parks.



Play Structures and Equipment for Children



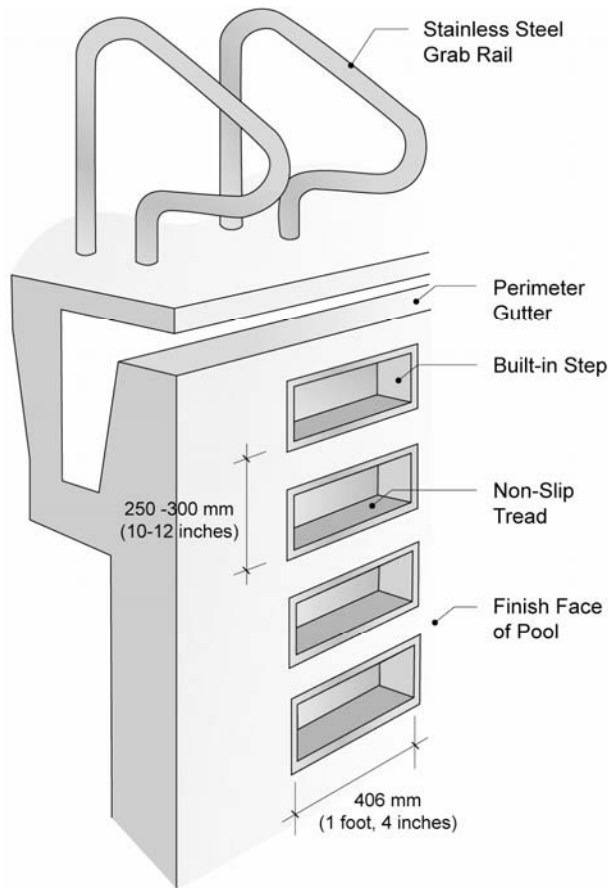
Play Structures and Equipment for Children

4-3.8 **Ladders and Grab Rails**

Steps and ladders shall be recessed or set into the pool wall. No ledges or projections are permitted under the water surface. Recessed ladders shall be provided in other areas. Grab rails and recessed steps are recommended over projecting ladders. Maximum spacing between grab rails shall be approximately 18.29 meters (60 feet). Locate grab rails and recessed steps at both ends of the long walls near the corners for 25-meter pools. Intermediate grab rails shall be provided on 50-meter or uniquely shaped pools.

Locate a ladder with grab rails no more than 5 meters (16 feet, 5 inches) from a diving board or water slide to get users out of the water quickly. This enables users to

essentially head right back toward the edge of the pool directly, so the next diver or slider can proceed safely. Position ladders so that swimmers don't have to cross the landing areas of diving boards and water slides if at all possible. This allows life guards to keep their focus at all times on the area around the board or slide by eliminating the need to track an exiting swimmer that has to leave the immediate area of the board or slide, which makes supervising the next diver or slider problematic.



Recessed Step Ladder Detail



Avoid Protruding Ladders When Possible



Utilize Recessed Step Ladders

4-3.9 **Pool Steps and Ramps**

One set of shallow water steps or a ramp with a slope of 1:20 is recommended for access into the shallow end of the pool enabling the elderly and handicapped to enter the pool. Provide non-slip surfaces embedded treads on the nose of stair landings and grab rails to prevent fall hazards.



Pool Steps



Pool Steps

4-3.10 **Spray Grounds**

Spray grounds are recommended instead of wading pools because they are generally safer, due to the fact that there is little standing water to create a drowning hazard for children. Spray grounds may include a wide variety of water play equipment designed specifically for children, which offer a greater variety of recreational opportunities than traditional wading pools. Provide spray ground equipment, as needed, to address the dependent population at each facility which offers similar types of experiences found at private sector water amusement parks. Water supplies and used water should be incorporated into the main pool's circulation and filtration system, where possible. Tap water supplies are acceptable if connections to the main pool system are not practical. Waste water may be discharged into the sanitary or storm sewer if permitted according to local codes. Consider the need to collect spray ground waste water for alternative purposes, such as irrigation or washing cars and planes, especially in areas where water conservation is critical. Physically separate spray ground areas from the main pool with a low fence or barriers with an automatically closing gate to prevent children from wandering into the main pool area.



Sprayground



Sprayground

4-3.11 **Wading Pools**

Existing shallow wading pools may be maintained, as needed, for small children to play and swim. Consider the possibility of replacing existing wading pools in need of repair

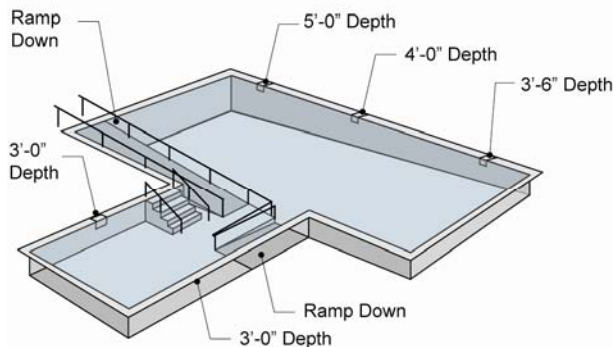
with spray grounds. Physically separate wading pools and spray ground areas from the main pool with a low fence or barriers with an automatically closing gate to prevent children from wandering into the main pool area. Typical areas for wading pools associated with 25-meter general use pools are approximately 9 sq. meters (100 sq. feet). For 50-meter pools, the wading pool size requirements are approximately 14 sq. meters (150 sq. feet). The depth of wading pools may range from 150 to 450 mm (6 to 18 inches) with a slope of 1:15. Water must be filtered more frequently than the main pool with a minimum turnover rate of at least eight times in 24 hours. Typical wading pool construction utilizes scuppers instead of a continuous perimeter overflow system as required for main pools. Dual drains are also required to prevent entrapment hazards. If utilized, wading pools should be located at the shallow end of the main pool. Parental supervision of children in wading pools is mandatory for safety. Provide adult seating opportunities for at least one parent for each child at maximum capacity.

4-3.12 **Shallow Water Instruction and Assembly Areas**

Consider the use of portable platforms that may be placed into the main pool to create shallow water environments that may eliminate the need for a wading pool, can be utilized for training or instructional courses, and can be removed, as needed, for other pool functions.

4-3.13 **Accessible Ramps and Equipment**

Consider the need for zero entry depth accessible ramps into pools or the need for aquatic lifts and other specialty equipment to aid the handicapped. Aquatic lifts may also serve a dual purpose by providing a good way to get an injured swimmer on a backboard out of the pool.



Accessible Entry Pool Detail



Consider Removable Accessible Entry Ramps

4-3.14 **Bulkheads**

Consider the need for movable fiberglass or stainless steel bulkheads that serve as barriers to re-divide water surface areas for separating multifunctional use. Movable bulkheads are very useful for competitive swimming events to provide variable short course lengths, as desired, and other recreational activities. Utilize moveable bulkheads with "flow thru" vertical surfaces where displaced water moves through the bulkhead for easier movability. Avoid bulkhead designs that have a "trampoline effect" or are required to maintain air at all times for structural integrity.



Moveable Bulkhead



Moveable Bulkheads

4-4 **POOL DECK AREA GUIDELINES**

Pool deck space requirements should include 3 sq. meters (33 sq. feet) of space per person at maximum capacity. Spectator seating is optional and .27 to .46 sq. meters (3 to 5 sq. feet) of additional deck area shall be provided for each spectator in the viewing area. Mandatory deck requirements include lifeguard stands and stations, backboards, head immobilizer, rescue tubes, a drinking fountain, public telephone, lounge chairs, umbrellas and other sun screens, and night lighting. Other potential FF&E includes supplemental chairs, dining tables, occasional tables, basketball goals, volleyball nets and poles, pace clocks, floor stand portable signs, starting blocks, backstroke stanchions, lockers, storage carts, lane lines and area dividers, and cover reels.

4-4.1 **Lifeguard Stations**

Provide movable lifeguard stations that can be repositioned, as required, for different activities and conditions. At least one elevated lifeguard stand is required for pools with a surface area of over 186 sq. meters (2,000 sq. feet). There shall be at least two lifeguard stands for pools over 371 sq. meters (4,000 sq. feet) or one for every successive 232 sq. meters (2,500 sq. feet) or major fraction thereof. Lifeguard stations shall be installed so that the edge of the footrest lines up with the pool edge and the direct line-of-sight to swimmers must not exceed 180 degrees for any one lifeguard. Line-of-site distances for pools must be less than 30 meters (100 feet).

Provide anchors embedded into the pool deck surface at potential locations for securing lifeguard stations and elevated chairs, as needed, at these movable locations. Embedded anchors should not pose a tripping hazard or protrusion hazard when these movable locations are not being utilized. Utilize lifeguard stations with accessories to secure life saving equipment, such as shepherd's crooks and ring buoys. Locations of lifeguard stations shall be chosen to reduce water surface glare. At least two lifeguards must be on duty and at their stations (chair stand or deck patrol) during open swim periods. At least one lifeguard is required to be on duty for every 50 swimmers. If alcoholic beverages are permitted, the lifeguard to swimmer ratio should be 40 to 1 or fewer.

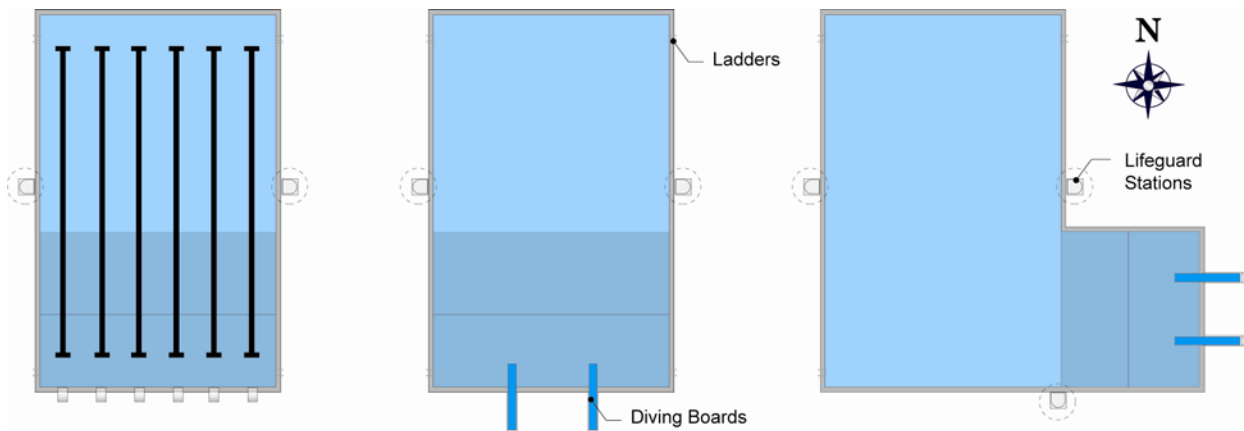


Permanent Lifeguard Stands with Shade Umbrellas



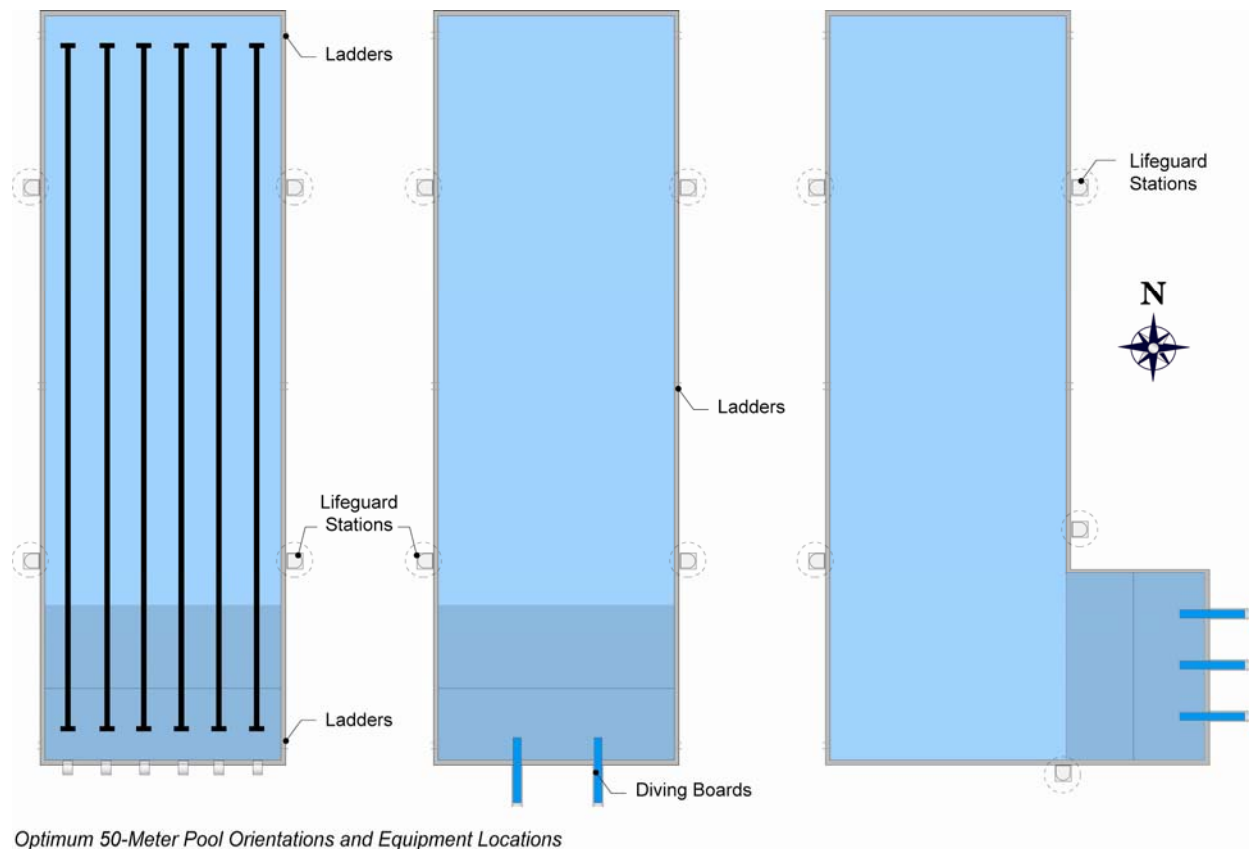
Utilize Portable Lifeguard Stands as Needed

4-4.1.1 **Figure: 25-Meter Pool Suggested Lifeguard Station Locations**



Optimum 25-Meter Pool Orientations and Equipment Locations

4-4.1.2 **Figure: 50-Meter Pool Suggested Lifeguard Station Locations**



4-4.2 **Life Safety Equipment**

Provide one rescue pole fitted with a life hook or shepherd's crook and a ring buoy for each 185 sq. meters (2,000 sq. feet) of water area or for each lifeguard station. Provide accessories at each lifeguard stand for securing these two required items. The maximum length of rescue poles shall be 3.7 meters (12 feet). All pools shall be supplied with at least one rescue pole, two rescue tubes or ring buoys attached to 18.3 meters (60 feet) of rope, and two pineapples (wound ropes) of length equal to one and a half times the pool width. Provide adequate storage facilities for all life safety equipment that is located within easy access to the pool deck.

4-4.3 **Depth Markings**

Provide pool depth markings every 3 meters (10 feet) or less. Depth markers are required at each 610 mm (2 feet) increment (or less) of water depth, at maximum and minimum depths, at transitions between deep and shallow water, and at diving areas. Shallow pool areas less than 914 mm (3 feet) shall be labeled "NO DIVING." Depth markers shall be located on the pool deck beside the pool edge and on the vertical side of the pool wall or gutter system above the water line so they are visible from inside the pool. The figures shall be at least 100 mm (4 inches) high, in a color that contrasts with the background. Mark a red or black line at least 100 mm (4 inches) wide on a sloping pool bottom wherever the depth reaches 1.5 meters (5 feet).



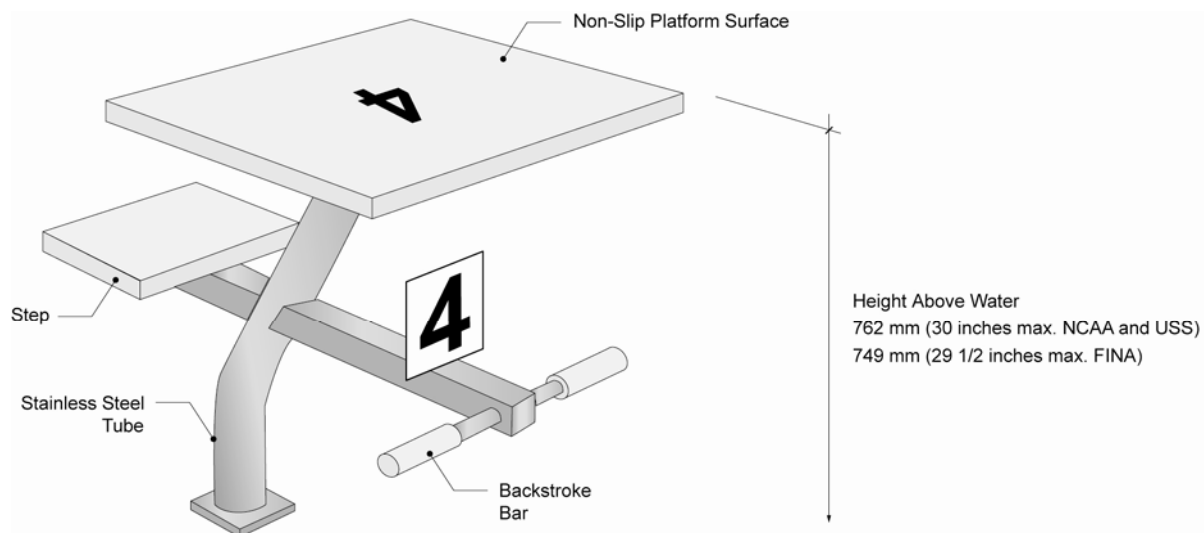
Deck Markings to be Integral to the Deck Surface



Depth Marking Required Inside the Pool and on Deck Surface

4-4.4 Starting Platforms

When competitive swimming is a program requirement, starting platforms shall be supplied for each course lane in the pool area. Starting platforms shall be 760 mm (2 feet, 6 inches) above the water level. The front edge shall be flush with the vertical end wall of the course. Platform widths shall be a minimum of 510 mm (20 inches). Platforms shall be sloped at not more than 10 degrees and shall be covered with a non-skid finish. Number starting platforms beginning with lane one to swimmer's right as they face the course. Provide anchors embedded into the pool deck, if needed, as appropriate for the starting platforms to be utilized.



Race Starting Platform Detail

4-4.5 Automatic Timing Devices

Where required, timing devices shall be equipped to be activated by the starter's gun. Automatic timing devices should be able to display all recorded information and the finish contact pads shall be activated by a light hand touch, but not by water turbulence. Do not have any exposed wires on the pool deck.

4-4.6 **Chairs, Tables, and Umbrellas**

Provide a variety of chairs, tables, and umbrellas designed for outdoor use around the pool deck. Utilize reclining lounge-style chairs for sunbathing and general pool side use. Provide some chairs and tables grouped together with movable umbrellas for shaded, informal seating areas. Utilize stackable chairs, where possible, to facilitate storage. Consider the off season storage areas available when selecting deck furniture to make sure it will fit within the areas provided. Chair and umbrella fabrics should be moisture resistant and designed for outdoor use. Do not use glass table tops.



Select Materials for Maximum Durability



Utilize Stacking Chairs to Facilitate Storage

4-4.7 **Sun Screens**

Provide large pool deck areas protected by overhead sun screens, especially around the check-in and bathhouse areas. Provide shade structures that provide shading for a portion of the pool water areas, common grass areas, and at least half of the spray ground or wading pool areas. Provide shade accommodations at each lifeguard station that are adjustable and can be moved according to changing sun conditions.



Provide Plenty of Sun Screens and Shaded Areas



Provide Shade for Both Deck and Water Areas

4-4.8 **Equipment Storage**

Provide adequate freestanding or built-in storage for instructional and recreational equipment, such as kickboards, floats, buoys, fins, masks, scuba equipment, noodles, pennants, swim trainers, scoreboard, chalkboard, electric clock, water polo goals, water basketball goals, volleyball equipment, pool cleaning equipment, lane markers, pool

covering, thermometer, backstroke lines, personal floatation devices (PFDs), aquatic exercise equipment, and other miscellaneous items. Consult with installation level personnel and the aquatic facility director regarding storage areas needed to meet program and operating policy requirements.

4-4.9 Locker Areas

Consider locating locker storage for clothes on the pool deck for customer convenience and monitoring. Locker storage for clothing may be located on the pool deck or within the dressing rooms. Typical floor area requirements for lockers are 4.65 to 9.29 sq. meters (50 to 100 sq. feet) for both 25- and 50-meter pools.

4-4.10 Water Fountains

Locate public water fountains accessible from the pool deck. Include full height and wheelchair accessible water fountains according to [ADA](#) requirements.

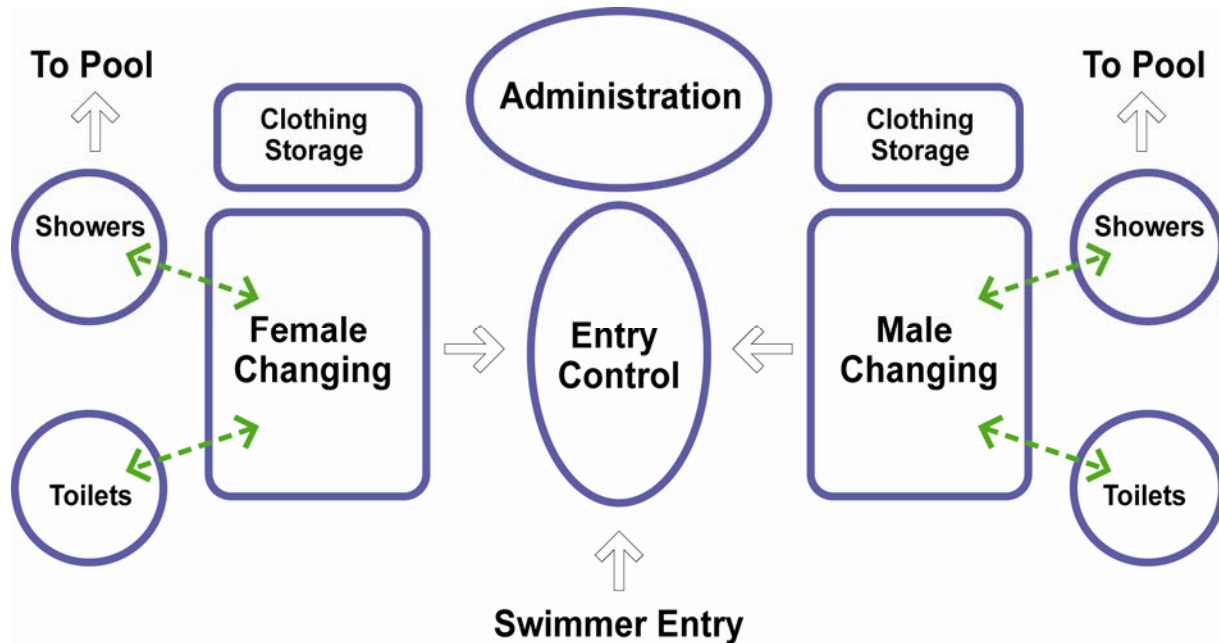
4-4.11 Deck Signage

Appropriate signs shall be provided regarding pool rules at the entrance to the pool deck and within the water areas. Depth markers and “No Diving” warnings shall be embedded components of the pool deck surface. “Danger” and “Warning” signs shall be provided, as appropriate, at entrances to the chemical and chlorine storage areas. Include signs that provide emergency numbers near the office telephone, warnings outside the pool area, room names, entry prohibitions, and instructions necessary for diving or special equipment.

4-5 BATHHOUSES AND NATATORIUM AREA GUIDELINES

Bathhouses normally contain the following core spaces: check-in area, male and female dressing rooms, showers, toilets, storage, offices, and administrative areas. These core spaces may be contained within the same building or separated into different structures, as desired. Food service, filter rooms, chemical storage, and mechanical equipment may also be contained within the bathhouse building; however some of these components may not be required to be located within a building structure and may need to be located in separate areas of the site for safety and functionality.

4-5.1 **Figure: Bathhouse Functional Area Relationships**



4-5.2 **Entry Control Checkpoints**

This area serves to monitor the flow of people in and out of the facility. If clothing storage is handled in this area, a basket or locker system is also required and the check-in area shall be immediately adjacent to dressing room exits onto the pool deck area. This space shall also serve as a surveillance station for the pool and deck area. Check-in areas shall be immediately adjacent to the entrances to both dressing areas. Visibility of and direct access to pool and deck areas is required. Typical floor areas required for a basket storage system includes 37 to 42 sq. meters (400 to 450 sq. feet) for a 25-meter pool and 56 to 60 sq. meters (600 to 650 sq. feet) for a 50-meter pool.

4-5.2.1 **Entry Control Checkpoint Area FF&E**

Furniture, fixtures, and equipment (FF&E) required for entry control areas include locker or basket storage systems for clothing, desk or check-in counter, staff chairs, telephone with PA systems, cash register, and an exterior clock visible from the pool area. Provide plenty of storage for small equipment and lost/found items. Optional items include a bulletin board.

4-5.2.2 **Natatorium Lobbies**

Designs for natatoriums should incorporate a lobby area that serves as the primary entrance to the facility for all participants, visitors, and spectators. Direct access from the lobby is required to all spectator viewing areas and dressing rooms. Public toilets, staff office, and concession areas (if utilized) shall be adjacent to this space. Visual monitoring of the lobby is required from the staff office or the check-in area. The floor area requirements for lobbies are approximately .28 sq. meters (3 sq. feet) for each occupant. At least 50 percent of the visitors in the largest spectator seating areas shall be accommodated. Include chairs, trash receptacles, a pay phone, and bulletin boards.

4-5.3 **Dressing Rooms**

Dressing areas are used by those participating in swimming programs for changing and dressing. In dressing rooms equipped with lockers or baskets, space is also provided for storage of personal belongings. Separate facilities shall be provided for men and women. Dressing areas shall be easily accessible to the pool deck and check-in area. Locate showers, lavatories, toilets, and drying areas within or adjacent to each dressing room. Typical floor areas required for dressing rooms with integral clothing storage are 46 to 84 sq. meters (500 to 900 sq. feet) for a 25-meter pool and 74 to 93 sq. meters (800 to 1,000 sq. feet) for a 50-meter pool. Lockers may be located inside the dressing room or on the pool deck for increased visibility and security.

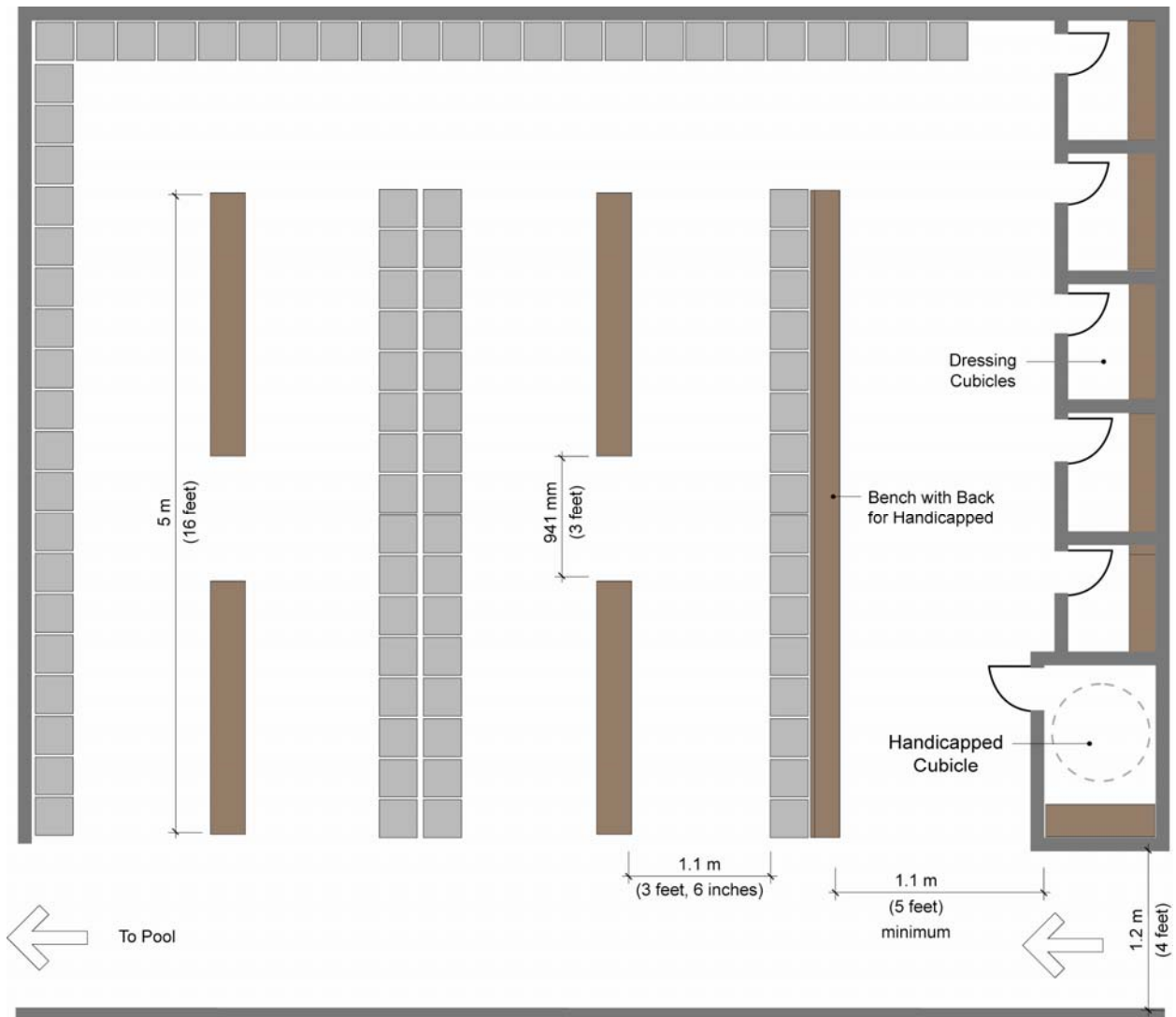


Dressing Room With Locker Storage

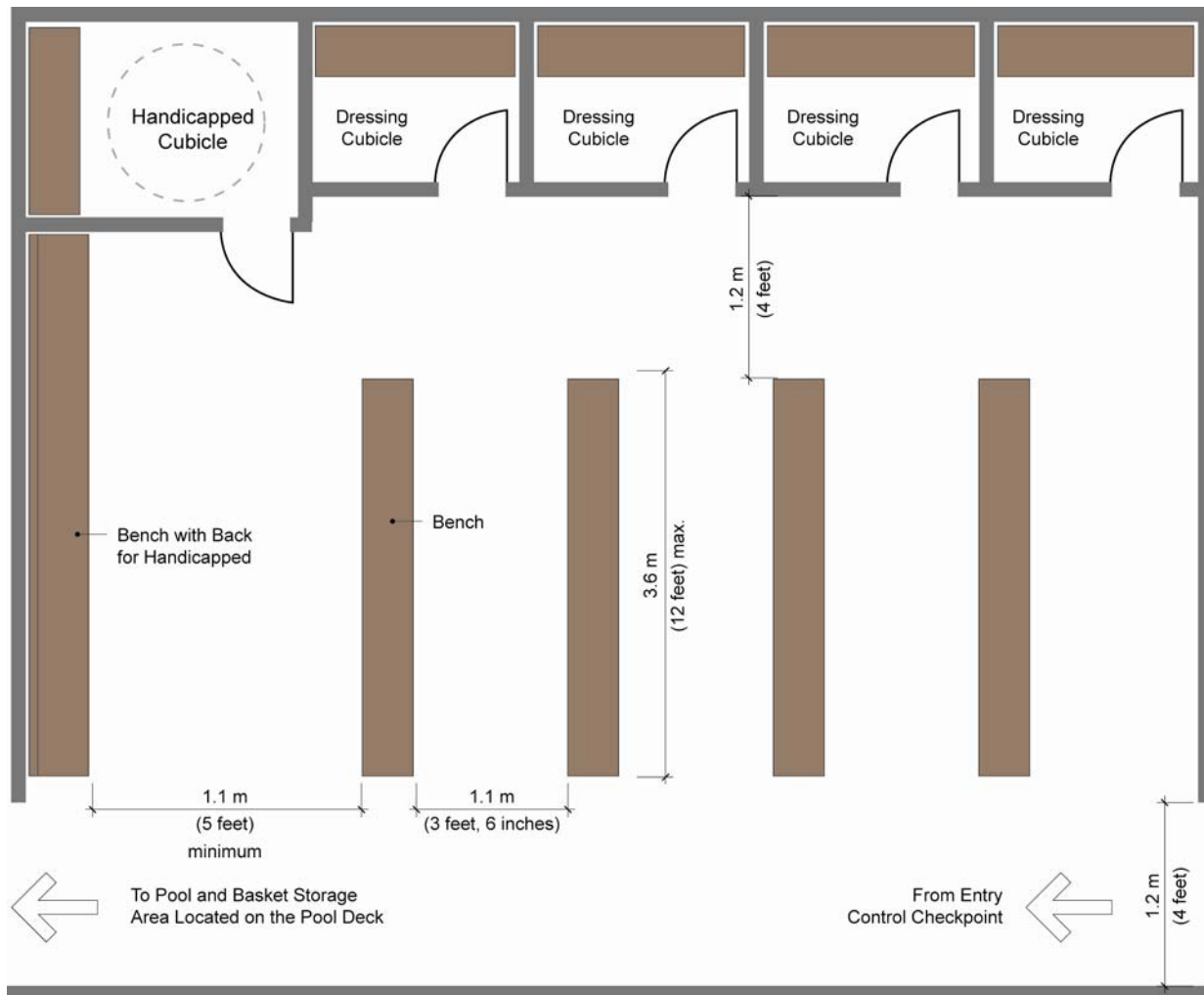


Dressing Room With Showers

4-5.3.1 Figure: Dressing Room with Locker Storage



4-5.3.2 **Figure: Dressing Room with Basket Storage**



4-5.3.3 **Family Dressing Rooms**

Consider the need for separate family dressing room(s) with showers, toilets, and sinks to serve the needs of single parent families and/or special needs of the disabled or elderly. If accessible off the pool deck, these family dressing rooms may also serve as public toilets.

4-5.3.4 **Dressing Room FF&E**

One basket or locker shall be provided for each user based upon the overall pool capacity. Provide additional lockers dedicated for use by the staff. Other furnishings and equipment include benches, vanity mirrors, one full length mirror, and ceiling fans. Include at least one bench with a back that can be used by the disabled and elderly. Optional equipment includes a clock, swimsuit driers, and a bulletin board. Provide wooden or recycled plastic bench seating, lavatories, mirrors, soap dispensers, and paper towel dispensers or blowers conveniently located near the lavatories. Provide sanitary napkin dispensers and disposal units inside the female dressing rooms. Consider the need for equipment like swimsuit and hair driers. Provide at least one GFCI electrical outlet near the sinks and mirrors. Provide baby changing

accommodations in both male and female dressing rooms. Include floor drains and adequate floor slopes for hosing and cleaning. Two to five dressing cubicles with seats or benches shall be provided in the women's dressing room.



Dressing Room Lavatories with Mirrors



Dressing Room Toilet Fixtures

4-5.4 Showers

Provide showers located inside or adjacent to each dressing room for customer personal hygiene use before and after swimming. Direct access is required from the showers to the dressing area. Separate facilities shall be provided for men and women. The exact size requirements for showers depend upon the peak number of potential customers and the type of shower facilities desired. Provide one shower for every 30 males and one shower stall for every 30 females. Each shower stall requires approximately 1.86 sq. meters (20 sq. feet). The typical floor area needed for both male and female shower areas is 27.87 to 46.65 sq. meters (300 to 500 sq. feet) for a 25-meter pool and 46.65 to 65.03 sq. meters (500 to 700 sq. feet) for a 50-meter pool.

At least one private shower cubicle shall be provided for use by the handicapped in accordance with [ADA](#) requirements. Handicapped access will not permit a lip at the edge of the shower. Shower stalls shall be furnished with showerheads mounted on a sidewall of the shower to allow for adjusting water temperature. All fittings and fixtures shall feature cut-off valves and be of commercial quality. Consider the need for vandal proof showerheads. Provide for proper drainage of each stall by using floor drains and/or perimeter trench drains.



Provide Private Shower Stalls for New Construction



Handicapped and Family Showers

Provide all private showers with attached drying area enclosures for new construction and major renovations. Do not allow direct views into the shower room areas. Locally determine the distribution of showers between the men and women's locker rooms and the total number of showers required. Consider adding shower caddies and/or built-in shelves in each stall for storage of soap and accessories. Provide commercial-grade built-in soap dispensers inside shower stalls and at lavatory sinks. Provide built-in towel racks and clothing hooks in drying areas. Utilize natural lighting whenever possible and waterproof lighting fixtures in all showers. Glass and glazing must not allow visual access from adjacent buildings or outside areas.

4-5.5 Toilets and Urinals

Provide both male and female toilet stalls in or near each dressing room area, including accessible facilities according to [ADA](#) requirements. Provide at least one low mounted urinal near the men's toilets for children and the handicapped. Direct access is required from the toilets to the dressing room areas. Locate toilets next to the showers and lavatory sinks for each sex. Refer to [Table 4-5.5.1](#) for information regarding the quantity of toilets and urinals required according to the overall size of each facility. The typical floor area required is 18.58 to 27.87 sq. meters (200 to 300 sq. feet) for a 25-meter pool and 37.16 to 55.74 sq. meters (400 to 600 sq. feet) for a 50-meter pool. Utilize flushometer style commercial toilets that are more durable and require less maintenance than tank-top residential models. Utilize graffiti-proof and corrosion resistant toilet stall partitions that are still attractive and compliment the interior design of the dressing room area. Consider utilizing recycled plastic toilet and urinal stall partitions because they are non-corrosive, cost effective, durable, and environmentally friendly. Provide air fresheners and deodorizing systems for toilets and urinals. Provide a separate exhaust system for the toilet areas in both the male and female dressing rooms.

4-5.5.1 Table: Toilet and Urinal Fixture Criteria

	Fixtures / Men	Fixtures / Women	Area Requirements
Water Closet	1 / 40	1 / 20	2.79 sq. meters (30 sq. ft.)
Handicapped WC	1 minimum	1 minimum	4.64 sq. meters (50 sq. ft.)
Urinal	1 / 40	N/A	1.4 sq. meters (15 sq. ft.)
Lavatory	1 / 40	1 / 40	.93 sq. meters (10 sq. ft.)
Handicapped Lavatory	1 minimum	1 minimum	3.72 sq. meters (40 sq. ft.)

4-5.5.2 Public Toilets

For large facilities, consider the need for additional public toilets for visitors and spectators because of the limited access requirements to the dressing room areas. Separate accessible toilets according to [ADA](#) guidelines shall be provided for both men and women. Utilize flushometer style commercial toilets that are more durable and require less maintenance than tank-top residential models. Each toilet room shall include a lavatory, mirror, soap dispenser, paper towel dispenser or blower, handrails, baby changing station, air fresheners, deodorizing systems, and a separate exhaust fan for each restroom. Locate public toilets near the lobby for natatoriums. Public toilets should be readily accessible to spectator viewing areas in all types of facilities. The peak number of spectators and visitors anticipated will establish the size and quantity of public toilets. Provide an equal number of public toilets for men and women unless local circumstances dictate otherwise.

4-5.5.3 Table: Public Toilet and Urinal Fixture Criteria

	Fixtures / Men	Fixtures / Women
Water Closet	1 / 250	1 / 150
Handicapped WC	1 minimum	1 minimum
Urinal	1 / 250	N/A
Lavatory	1 / 200	1 / 150
Drinking Fountain	1 / 400	1 / 400

4-5.6 Office and Administration Areas

Locate office and administrative areas adjacent to the entry control checkpoint. Visual monitoring of and easy access to the water and deck areas from these spaces is mandatory. The staff lounge, training rooms, and food service areas may be located away from the entry control checkpoint, but should also have views of the water and deck areas, where possible. Include floor drains and adequate floor slopes to prevent standing water.

4-5.6.1 **Administration Office**

An office with a lockable door is required for use by the aquatic facility director and staff as a control center and a place for the aquatic facility director to conduct day to day business, which includes counseling the staff. Provide a separate small lounge area for pool staff and lifeguards. Size requirements for the staff office are approximately 9.29 sq. meters (100 sq. feet) for all facility sizes. Under no circumstances shall an office exceed 13.38 sq. meters (144 sq. feet). Provide a desk with compatible chair in the office area and at least two visitor chairs along with a telephone, data and phone connections, file cabinets, shelving units, and a bulletin board. A cool ventilated office is needed in the office area to maintain the pool test kit chemicals.

4-5.6.2 **Staff Lounge**

Room size requirements for the staff lounge will be determined by the number of staff and the needs of those using each space. Central controls for the public address, lighting systems, and all environmental controls may be located in the staff lounge or administrative office. The staff lounge should include a work table with chairs, as needed, to accommodate the staff, bulletin board, staff lockers, time-clock, refrigerator, microwave, storage shelves, first aid kit, and cabinets. Consider the need for a washer and dryer.



Staff Lounge/Break Room



Traning Room

4-5.6.3 **Training Rooms**

An optional training room may also be needed to conduct instructional classes and demonstrations in a conference setting. For small facilities, this room may be combined with the staff lounge. Design the room so that it can be darkened for film presentations. Provide locally controlled dimmer switches for lights. Consider the need for telephone and video conferencing and provide the required infrastructure for these capabilities. Provide a lockable credenza or storage cabinets, a table, stacking chairs, television with VHS/DVD player, and a trash can. Provide modular furniture, a conference table, computer data connections with high-speed Internet access, a speaker phone, and ample electrical power accommodations. Consider the need for a drop-down projection screen and wall mounted white boards. Provide a bulletin cork board for posting changeable information.

4-5.7 **First Aid Equipment and Supplies**

Provide at least one backboard with arm, torso, and leg immobilization straps, a separate head and neck immobilization system, and a stretcher. Maintain a fully stocked first aid kit with mouth-to-mouth resuscitation masks or guards to prevent disease transmission and other general first aid medical supplies. Refer to [AHFOSH 48-14](#), *Swimming Pools, Spas and Hot Tubs, and Bathing Areas* for additional information regarding first aid requirements. [OSHA](#) approved eye wash stations and other protective equipment are required in the pool equipment and chemical storage areas.



Provide Storage for First Aid Equipment and Supplies



Consider the Need for Food and Beverage Service

4-5.8 **Concession, Resale, and Vending Areas**

Consider the need for food and beverage service within the aquatic facility compound. At a minimum, provide water fountains and vending machines for light snacks, candy, and cold drinks located near the administrative areas of the bathhouse or in a covered area of the pool deck. Coordinate with the aquatic facility director regarding the need for a resale and concession area that may offer a variety of food and beverage options, like coffee, hot dogs, hamburgers, and ice cream along with other items for resale such as T-shirts, hats, sunscreen, and other amenities. Typical space requirements range from 9.3 to 14 sq. meters (100 to 150 sq. feet). Outdoor pools may include a concession area that includes tables and seating as desired at each facility. Seating areas should have good visibility of the pool and deck and some shading. Refer [2001 US Food Code with 2003 supplement](#) when considering concessions area to ensure inclusion of all required sanitary areas. If cooking of food items like hamburgers and hotdogs is to be done on-site, ensure that the concession kitchen meets requirements outlined in [NFPA 96](#), *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*.

Concession and vending areas should be adjacent or easily accessible from the pool deck and major sunbathing areas. Separate concession and vending areas from the pool area as required by policies at each facility. Service access shall be provided through an entrance separate from the customer entrance to the facility. Consider the need to provide electrical, water, and parking space to accommodate a mobile concessions trailer that may be located near the pool deck and moved when not in use. A mobile concessions trailer may also be used in other areas of the base for athletic

events, air shows, and other special events. Utilize materials and finishes that are water resistant and can be easily cleaned. No food or beverage items shall be distributed in glass containers or bottles. Concession facilities should be located close to the picnic area, and need power, wash down, and easy access by vendors with handcarts.

4-5.9 Mechanical Rooms

Mechanical rooms will be required for natatoriums and the bathhouses for outdoor pools to accommodate HVAC equipment, plumbing, electrical, hot water, telephone, fire suppression, and other building systems equipment. This room shall serve as the primary location for the mechanical and electrical equipment for the facility. Locate mechanical rooms so that they have entry and service doors located on the outside of the building only, to minimize noise and service disruptions. If possible, location of the entrance to the mechanical rooms should not be at the front of the facility but to the side or rear (allowing for access). This is to minimize the impact these areas have on the aesthetic appearance of the facility.

Provide sound proofing, where required. Utilize a sloped floor towards a floor drain for rooms with equipment involving water or that may leak. All circulation associated with mechanical services and maintenance operations shall be separate from circulation provided for participants and the public. Mechanical rooms shall be located to minimize the lengths of distribution services or "runs." Service doors shall be treated architecturally in a manner that will minimize their visibility or impact on the building design.

4-5.10 Equipment Storage

Provide equipment storage for all life saving equipment, instructional, and competition swimming supplies. Include accommodations for pool cleaning equipment, supplies, and other items related to pool functions. Equipment storage space must open directly onto the pool deck. This space must be quickly reached by staff members in case of emergency. It should also be close to the staff office and lifeguard stations. The width of the storage room should be a minimum of 2.44 meters (8 feet) to allow storage of materials on either side of a small aisle. The minimum length is usually established by the length of the shepherd's crook or other safety poles used in life saving procedures. Access to the storage room should be double doors with a minimum width of 1.83 meters (6 feet). This will allow easy access to stored items and reduce the possibility of damage to the doors/surrounding walls caused by placing/removing large items in the storage area.

A length of 4.88 meters (16 feet) is recommended if safety equipment has not been selected prior to design. Verify storage requirements with the aquatic facility director at each installation, since special storage requirements may be required for instructional items like kickboards, racing lane floats, ropes, flags, starting platforms, and other competition equipment, as well as equipment for games or water shows. Pool maintenance equipment includes a pool vacuum, water testing supplies, hose reels, sprinklers, scoop nets, and miscellaneous tools. Typical safety equipment includes shepherd's crook, ring buoys, life poles, life lines, resuscitator, first aid equipment,

backboard, and a stretcher. The equipment room should be well ventilated and the floor should be sloped to a floor drain to help reduce moisture and mildew.

4-5.11 Maintenance Storage

Provide space to store equipment and supplies required for the maintenance of the facility. There are no specific adjacency requirements, but access to this area from the pool deck is usually avoided unless grass areas are planned inside the pool fence. The recommended minimum size is 1.83 x 2.44 meters (6 x 8 feet), but the final size requirements will depend upon the equipment to be stored. Major items, such as lawn mowers and ladders, will dictate the size requirements. Include room for other maintenance items, like rakes, brooms, clippers and cleaning equipment. Include adequate lighting and ventilation to prevent excessive moisture and mildew.

4-5.12 Custodial Closets

Provide a custodial closet for storage of janitorial equipment and supplies, including other maintenance items for the dressing rooms, showers, and toilets. Include a floor mounted mop sink, dry storage for supplies, shelves for maintenance supplies, and a sloped floor with a floor drain. All surfaces must have water-resistant finishes. The recommended minimum size is 1.21 x 1.83 meters (4 x 6 feet). Provide shelves and hooks for cleaning and maintenance equipment and supplies. Include adequate lighting and ventilation to prevent excessive moisture and mildew.

APPENDIX A

REFERENCES

A-1 GOVERNMENT PUBLICATIONS

1. Air Force Services Agency
<http://www-p.afsv.af.mil>

HQ AFSVA
10100 Reunion Place
San Antonio, TX 85216-4138

[AFI 32-1067](#), *Water Systems*

[AFH 32-1084](#), *Facility Requirements*

[AFI 34-110](#), *AF Outdoor Recreation Programs*

AFI 34-268, *Outdoor Recreation Programs and Procedures*

[AHFOSH 48-14](#), *Swimming Pools, Spas and Hot Tubs, and Bathing Areas*

[AFI 34-209](#), *Non-appropriated Fund Management Financial Management*

[AFI 48-145](#), *Occupational Health Program*

[AFI 65-106](#), *Appropriated Fund Support of Morale, Welfare, and Recreation and Non-appropriated Fund Instrumentalities*

[AFOSH Standard 91-501](#), *Air Force Consolidated Occupational Safety Standard*
2. Air Force Center for Environmental Excellence
<http://www.afcee.brooks.af.mil/afceehome.asp>

HQ AFCEE
3300 Sidney Brooks
Brooks City-Base, TX 78235-5112

[Air Force Interior Design Guidelines](#)

[USAF Landscape Design Guide](#)

[Air Force Sustainable Facilities Guide](#)

[AFSVA Golden Eagle Standards](#)

[USAF Force Protection Design Guide](#)

3. Air Force Civil Engineer Support Agency
<http://www.afcesa.af.mil>

HQ AFCEA/CES

139 Barnes Drive, Suite 1
Tyndall AFB, FL 32403-5319

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2803 52nd Ave.
Hyattsville, MD 20781-1102

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Engineering Innovation and Criteria P-80
Facility Planning Office
1510 Gilbert Street
Norfolk, VA 23511

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*Comprehensive Regional Planning
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MIL-HDBK-1003/1, *Plumbing*

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Air Conditioning, and Dehumidifying
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NAVFAC Cost Engineering

7. SECNAV/OPNAV Directives Control Office
<http://neds.nebt.daps.mil/usndirs.htm>

N09B15
Washington Navy Yard, Bldg. 36
720 Kennon Street, SE Rm 203
Washington Navy Yard, DC 20374

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8. U.S. Department of Commerce
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International Trade Administration Electric Current Abroad (1998)
14th & Constitution Ave, NW
Washington, DC 20230
(202) 482-3917
9. U.S. Department of Labor
<http://www.osha.gov>

Occupational Safety & Health 29 CFR 1910.1048,
Administration *Formaldehyde Standard*
200 Constitution Avenue, NW
Washington, DC 20210
(800) 321- 6742
10. National Institute of Building Sciences
<http://www.nibs.org>

1090 Vermont Avenue, NW *Whole Building Design Guide*
Suite 700 <http://www.wbdg.org>
Washington, DC 20005-4905
(202) 289-7800
11. National Archives and Records Administration
<http://www.access-board.gov/ufas/ufas-html/ufas.htm> - ABA

700 Pennsylvania Avenue, NW Architectural Barriers Act
Washington, DC 20408 (Public Law 90-480) of 1968
(866) 325-7208

<http://www.access-board.gov/ufas/ufas-html/ufas.htm> Uniform Federal Accessibility Standards
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<http://www.access-board.gov> 28 CFR Part 36, the Americans with
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12. Center for Disease Control
<http://www.cdc.gov/healthyswimming/>
13. Consumer Product Safety Commission
<http://www.cpsc.gov/> *Guidelines for Entrapment Hazards:*
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A-2 **NON-GOVERNMENT PUBLICATIONS**

1. ASTM International
 <http://www.astm.org>

 100 Barr Harbor Drive *F1487 Standard Consumer Safety*
 PO Box C700 *Performance Specification for*
 West Conshohocken, *Playground Equipment for Public Use*
 Pennsylvania, 19428-2959
 (610) 832-9585

2. International Code Council
 <http://www.iccsafe.org>

 Headquarters International Plumbing Code
 5203 Leesburg Pike International Mechanical Code
 Suite 600 International Building Code
 Falls Church, VA 22041

3. National Fire Protection Association
 <http://www.nfpa.org>

 1 Batterymarch Park NFPA 70, *National Electric Code (2002)*
 Quincy, Massachusetts 02169-7471 NFPA 72, *National Fire Alarm Code*
 (617) 770-3000 NFPA 90A, *Standard for the Installation*
 of Air-Conditioning and Ventilating
 Systems

 NFPA 101, *Life Safety Code*

 [NFPA 96](#), *Standard for Ventilation*
 Control and Fire Protection of
 Commercial Cooking Operations

4. The United States Green Building Council
 <http://www.usgbc.org>

 US Green Building Council LEED™ Green Building Rating System
 1015 18th Street, NW, Suite 805
 Washington, DC 20036

A-3 INDUSTRY ORGANIZATIONS

1. National Swimming Pool Foundation
 <http://www.nspf.org/>
2. Swimming Pool Institute
 www.nspi.org/
3. The Association of Pool and Spa Professionals
 <http://www.theapsp.org/Home/>

A-4 COMPETITIVE SWIMMING ORGANIZATIONS

1. Amateur Athletic Union (AAU)
 <http://image.aausports.org/index.html>
2. Federation Internationale de National (FINA)
 <http://www.fina.org/>
3. National Collegiate Athletic Association (NCAA)
 <http://www2.ncaa.org/>
4. National Federation of State High School Associations (NFSH)
 <http://www.nfhs.org/ScriptContent/Index.cfm>
5. USA Swimming (USS)
 <http://www.usaswimming.org/usasweb/DesktopDefault.aspx>

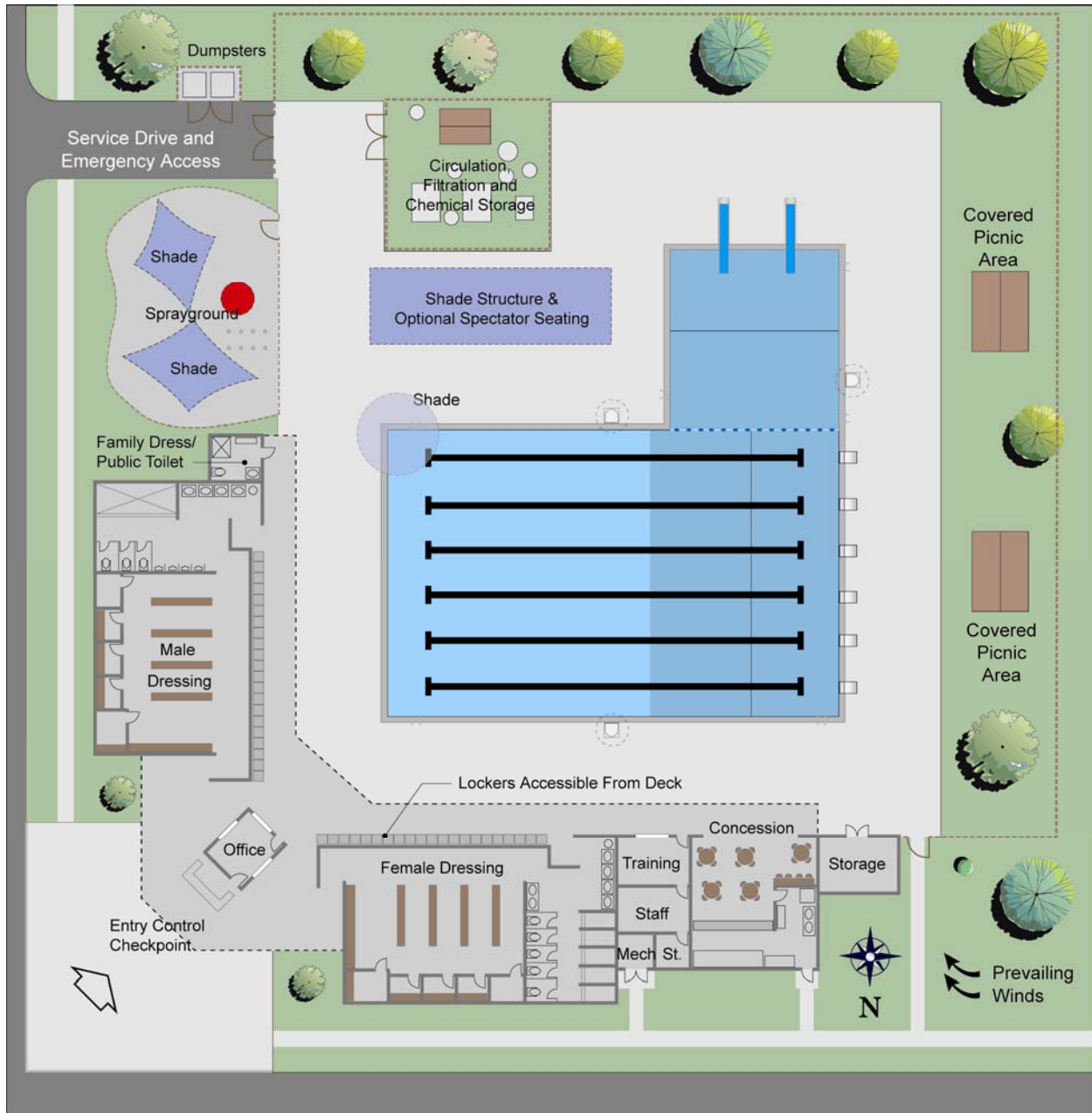
APPENDIX B

REFERENCE DIAGRAMMS

B-1 ILLUSTRATIVE DIAGRAMMS

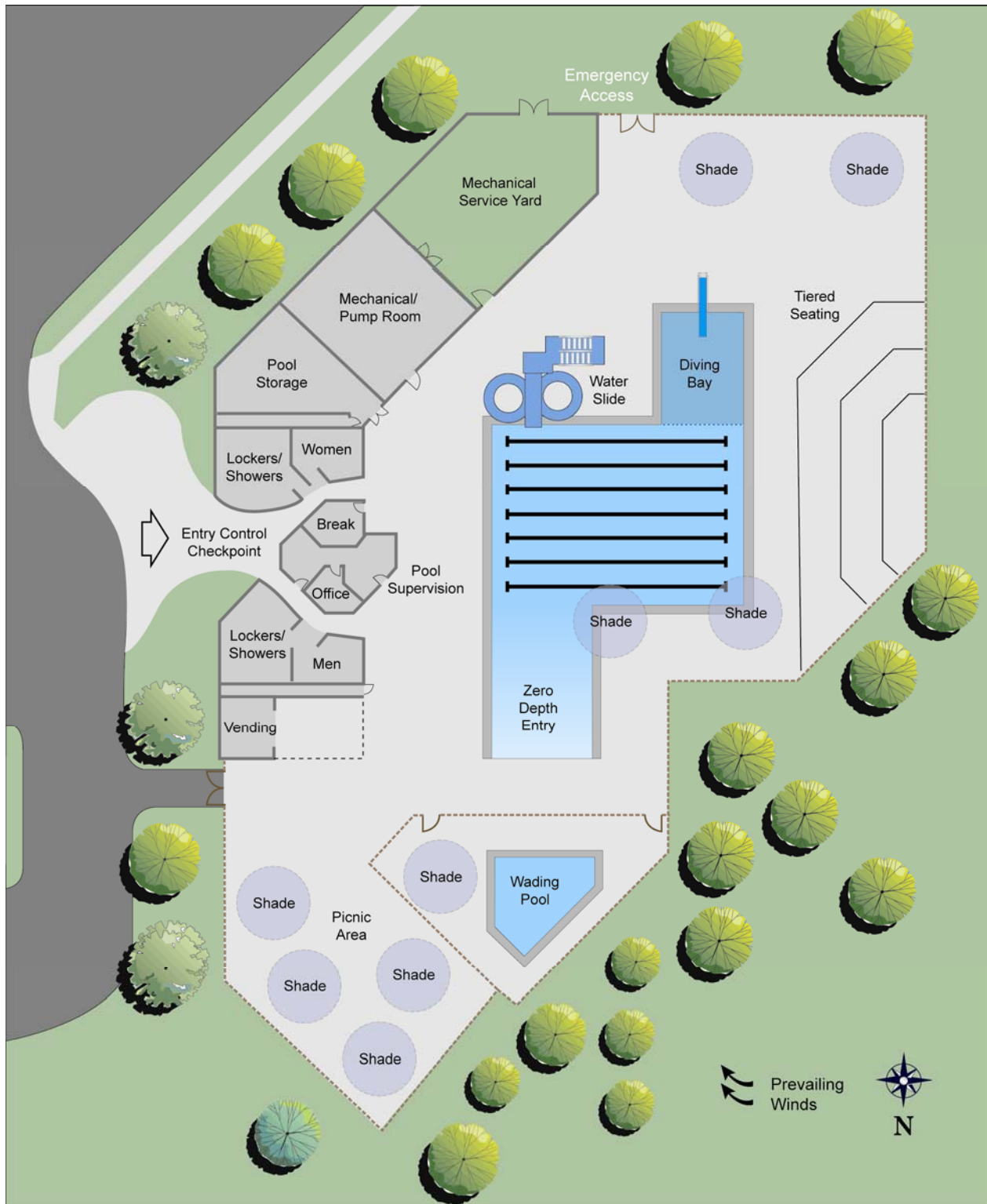
Each project requires a unique design tailored to the local character of the base, the site, and the needs of the user population. The following schemes are illustrations of design concepts based on the assumed conditions and requirements of a fictitious base. They do not represent mandatory or even suggested layouts, but are provided to expand on the functional diagrams and other UFC to convey a *possible means* to accommodate the needed adjacencies. The following illustrative diagrams address prototypical aquatic facilities (Figures B-2 through B-5).

B-2 **25-METER COMPETITIVE OUTDOOR AQUATIC FACILITY**



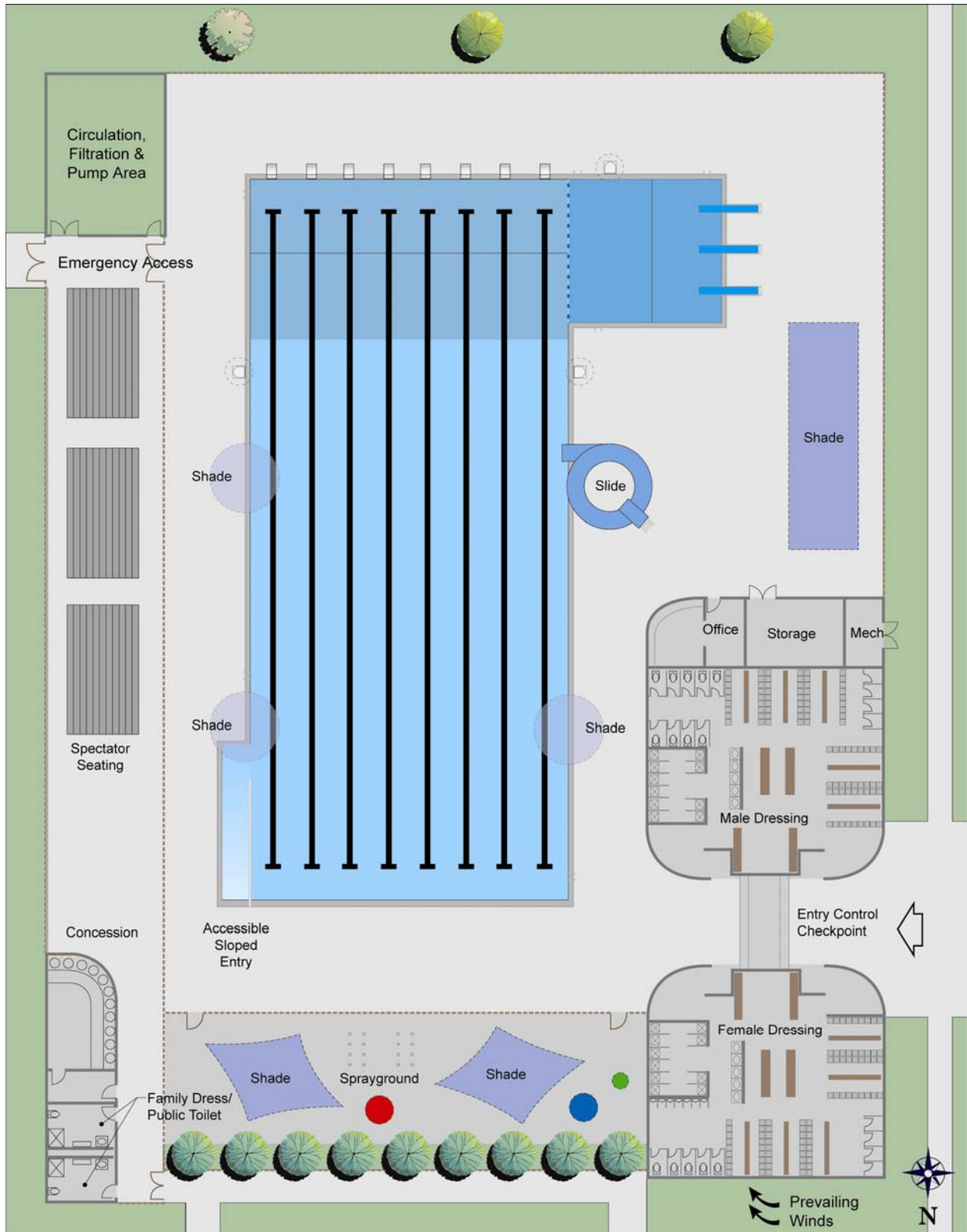
B-3

25-METER RECREATIONAL OUTDOOR AQUATIC FACILITY



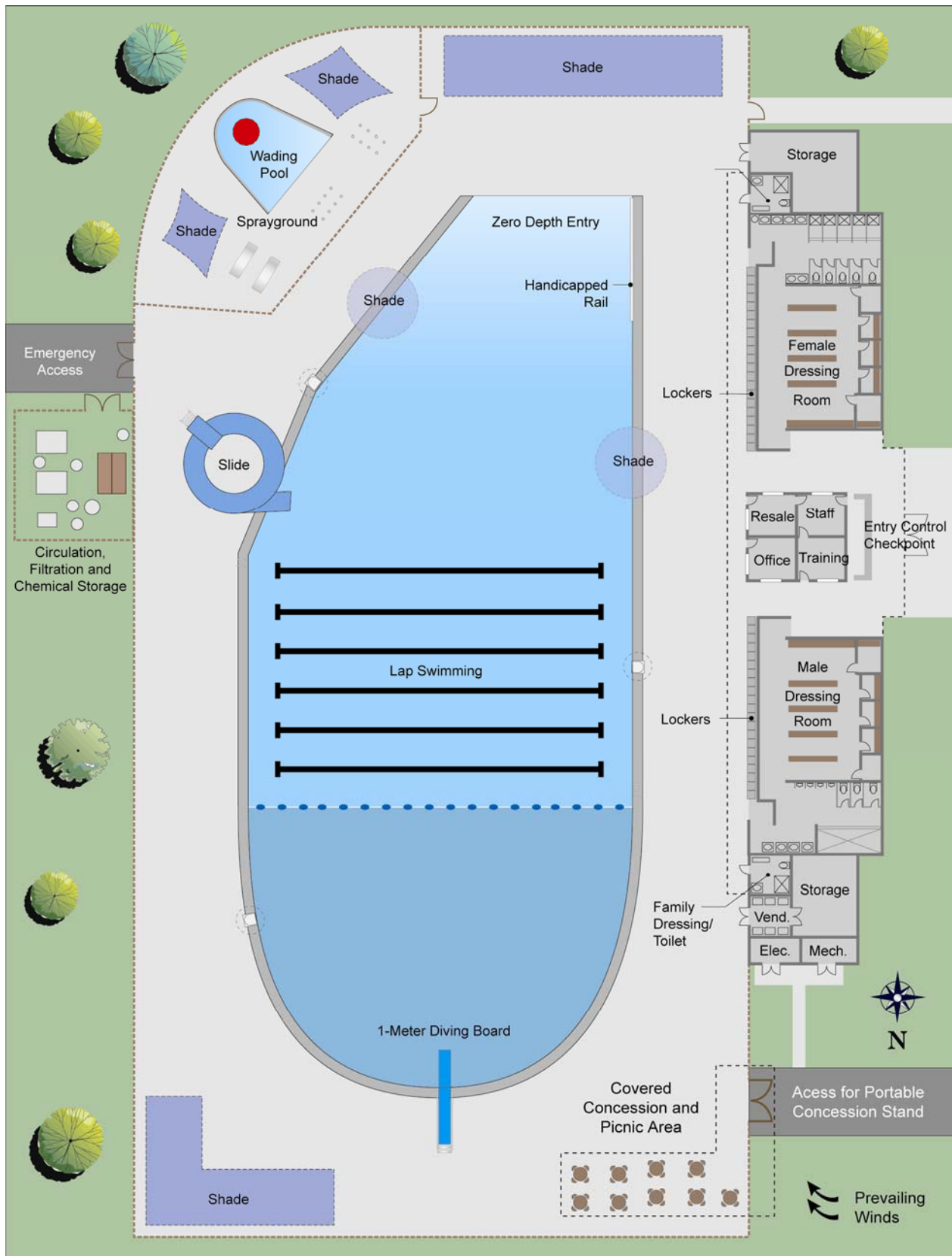
B-4

50-METER COMPETITIVE OUTDOOR AQUATIC FACILITY

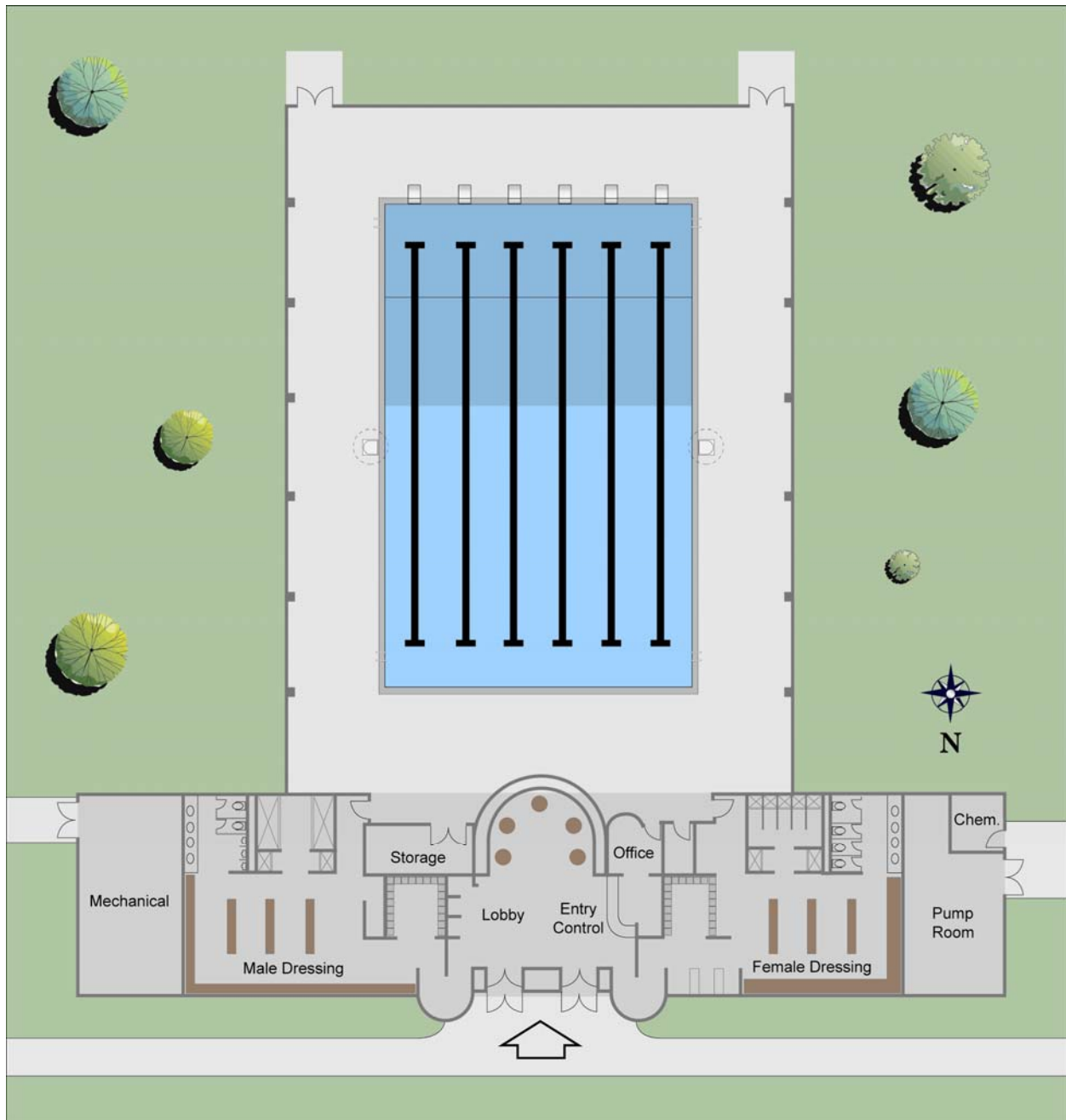


B-5

RECREATIONAL OUTDOOR AQUATIC FACILITY



B-6 25-METER NATATORIUM



APPENDIX C

FIGURES AND TABLES

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FIGURES

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3-3.8.6.1	Figure: Multi-Cell High Rate Sand Filters
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C-2

TABLES

<u>Table</u>	<u>Title</u>
2-2.2	Table: Space Allowances
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3-3.11.3	Table: Underwater Lighting Criteria
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3-5.3.3	Table: Locker and Basket Storage Systems Comparison
3-7.8.1	Table: Artificial Lighting Criteria
4-5.5.1	Table: Toilet and Urinal Fixture Criteria
4-5.5.3	Table: Public Toilet and Urinal Fixture Criteria

APPENDIX D

GLOSSARY OF ACRONYMS

AAU. Amateur Athletic Union
ABA. Architectural Barriers Act
ABC. Association of Boards of Certification
ACC. Air Combat Command
ACO. Administrative Contracting Office
ACRL. Association of College and Research Libraries
ADA. Americans with Disabilities Act
A/E. Architect/Engineer
AEI. Architectural and Engineering Instructions
AFCEE. Air Force Center for Environmental Excellence
AFCESA. Air Force Civil Engineer Support Agency
AFDIR. Air Force Directive
AFH. Air Force Handbook
AFI. Air Force Instruction
AFOSH. Air Force Occupational Safety and Health
AFMAN. Air Force Manual
AFMS. Air Force Manpower Standard
AFPD. Air Force Policy Directive
AFRES. Air Force Reserve
AFSVA. Air Force Services Agency
ANSI. American National Standards Institute
APF. Appropriated Funds
ASTM. American Society for Testing and Materials
AT/FP. Antiterrorism / Force Protection
BCE. Base Civil Engineer
BEAP. Base Exterior Architectural Plan
BES. Bioenvironmental Engineering Service
BRAC. Base Realignment and Closure
CATV. Cable Television

CCTV. Closed Circuit Television
CE. Civil Engineer
CES. Civil Engineer Squadron
COMPUSEC. Computer Security
CONUS. Continental United States
COSATI. Committee on Scientific and Technical Information
CPSC. U.S. Consumer Product Safety Commission
dBA. Decibels
DDN. Defense Data Network
DE. Diatomaceous Earth
DoD. Department of Defense
DoDI. Department of Defense Instruction
DoDLS. Department of Defense MWR Aquatic Facility Standards
DoE. Department of Energy
DSN. Defense Switched Network
E-Mail. Electronic Mail
EAP. Education Assessment Program
EMCS. Energy Management and Control System
EPA. Environmental Protection Agency
EPL. Electronic Publishing Aquatic Facility
ESO. Education Services Officer
ETS. Electronic Transfer System
FADS. Fire Alarm and Smoke Detection System
FAR. Federal Acquisition Regulation
FDS. Family Discovery Center
FEDLINK. Federal Aquatic Facility and Information Network
FED-STD. Federal Standard
FEMP. Federal Energy Management Program
FF&E. Furniture, Fixtures, and Equipment
FINA. Federation Internationale de National
FOA. Field Operating Agencies
FPCON. Force Protection Condition
FY. Fiscal Year

GES. Golden Eagle Standards
GFCI. Ground-Fault Circuit Interrupter
GSA. General Services Administration
HAWC. Health and Wellness Center
HID. High Intensity Discharge
HQ USAF. Headquarters United States Air Force
HVAC. Heating, Ventilating, and Air Conditioning
IESNA. Illuminating Engineering Society of North America
IT. Information Technology
LAN. Local Area Network
LEED. Leadership in Energy and Environmental Design
MAJCOM. Air Force Major Command
MILCON. Military Construction
MIL-HDBK. Military Handbook
MWR. Morale, Welfare, and Recreation
NATO. North Atlantic Treaty Organization
NAVFAC. Naval Facilities Engineering Command
NCAA. National Collegiate Athletic Association
NEC. National Electric Code
NFPA. National Fire Protection Association
NFHS. National Federation of State High School Associations
NISO. National Information Standards Organization
NPDES. National Pollution Discharge Elimination System
NRC. Noise Reduction Coefficient
OCONUS. Outside Continental United States
OPNAV. Chief of Naval Operations
PA. Public Address
PACAF. Pacific Air Force
PDWS. Public Drinking Water System
PFD. Personal Floatation Device
PM. Project Manager
PVA. Project Validation Assessment
PWS. Performance Work Statement

SCUBA. Self Contained Underwater Breathing Apparatus

SOW. Statement of Work

SRAN. Supply Record Account Number

UFAS. Uniform Federal Accessibility Standards

UFC. Unified Facilities Criteria

UIC. Underground Injection Control

US. United States

USAF. United States Air Force

USAFE. United States Air Force Europe

USAFSE. United States Air Force Supervisory Examination

USCG. United States Coast Guard

USGBC. United States Green Building Council

USS. USA Swimming

UV. Ultra-violet (sunlight)

WIMS. Work Information Management System